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CONSULTING

Media and Communications Supply Chain Analysis

Ovum Report to DBCDE

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1 Key Findings

The digitisation of service delivery over networks and the spread of the IP networking protocol have enabled significant changes in the supply chain for communications and media services. We see three main supply chain trends arising from this change:

- The separation of the Internet applications industry from the underlying IP connectivity industry, splitting industries that were traditionally vertically integrated
- The horizontal integration of both the applications and the infrastructure industries, though for different reasons. Applications aggregators are integrating different kinds of applications in order to leverage their common investments in applications support platforms. Infrastructure owners such as telcos and cloud service providers are consolidating to achieve economies of scale that can offset declining margins
- The internationalisation of application markets and the emergence of global applications and of global aggregators like Google and Apple.

Underneath these top-level trends, however, there is a great deal of industry detail that qualifies these trends. This report documents industry specifics around voice, messaging, music, game and video services in section 5. To take one important example, the distinction between communications and media services is becoming blurred but it has not been eliminated, due to the persistence of traditional content licensing regimes which still constrain the media industry. This has also held up internationalisation of content applications.

These trends have important implications for the patterns of market power in the communications and media industries. The most important developments are the steady decline in the market power of network and IT infrastructure owners, and the rise of global "managed device platform" (MDP) providers who control device operating systems and application ecosystems. The MDP's achievement of critical mass on a global scale has raised barriers to entry against potential competitors. Google and Apple are the most prominent examples.

Privacy and security are also affected. Much of the new application ecosystem is supported by advertising, and the growth of personal data trading and individual profiling has accelerated over the last two years. There is a risk of a privacy backlash that could have significant implications for the funding of future application development. At the same time, the "virtualisation" of network and IT infrastructure, with the increasing standardisation and real-time control of network elements based on standard interfaces, is making networks more efficient but is also introducing new infrastructure vulnerabilities.

These trends also challenge local content rules and community standards regulation, since international applications cross jurisdictional lines. At the same time, the consolidation of applications development and aggregation around global MDPs may simplify the management of these issues in the future.

Finally, the recognition of broadband IP access as the enabler of the benefits of the application ecosystem has led to a rising interest in broadband access, reflected in the overall trend towards policies in support of infrastructure investment.

At the same time as these technology-enabled trends have emerged, there has also been a significant change on the demand side. Research by Ovum and others shows that the traditional passive identities of "subscriber" and "audience" are giving way to a more active, "consumer" identity amongst users of services. Different consumer segments differ in their preparedness for this transition, which will challenge policy-makers who seek to adapt policy to these new industry conditions.

2 Project Background

2.1 Scope of the project

The DBCDE has asked Ovum to develop a report which describes and analyses the supply chains for the production and delivery of both mass consumed digital media and communications services and emerging digital media and communications services. The analysis will have regard to domestic and international markets and include:

- Existing supply chains versus new and emerging supply chains
- Business models and strategies employed by the key players involved within the supply chains
- A high level assessment of competition and competitive advantage in the supply chains
- A high level view of relative costs across the supply chain.

In this context, the report also describes and analyses the key implications for consumers over the medium term, resulting from likely changes to the supply chains of digital media and communications services.

In addition, the report contains three case studies that detail the supply chains of specific media and communications services.

2.2 Structure of the report

The report's methodology is to examine the differences between traditional and emerging value chains, particularly the patterns of horizontal and vertical integration and disintegration, for a range of communications and media services. In addition, the report examines the current and potential impact of supply chain changes on the consumer environment. This analysis is conducted in Section 3.

Although there are broad supply chain trends that affect both communications and media services, much of the emerging infrastructure supply chain is common to a range of new services. This infrastructure supply chain is examined in more detail in Section 4.

There are important differences between different industry verticals that use this infrastructure. In order to understand these differences, supply chain changes and consumer impact are assessed for five different supply chains:

- instant messaging and voice for communications services.
- digital gaming, digital music and video entertainment for media services.

Section 6 includes three case studies of emerging market players to demonstrate the issues at an operator level. These case studies of supply chain relationships have been prepared for emerging players in the voice, gaming and video entertainment industries.

2.1 Why the supply chain matters

Changes to the supply chain for communications and media services have affected consumers of those services in several ways.

The most obvious impact is the proliferation of devices and suppliers that consumers face, a result of an increasingly complex supply chain. The trend away from vertically integrated

supply chains has multiplied the range of service providers that the consumer must now manage. These now include device manufacturers, connectivity provider and application providers. Behind each of these three is another supply chain, often with their own pattern of cross-linkages that manifest the attempts of these players to expand into each other's domains.

More deeply, the emergence of the IP protocol and the digitisation of service activities, along with the growing specialisation amongst infrastructure and service providers, have resulted in new patterns of disintegration and re-integration along the supply chain, both vertical and horizontal. Broadly, we are seeing a trend away from vertical integration and towards horizontal integration:

- Applications and the underlying infrastructure are often provided by separate players
- Different applications are increasingly likely to be bundled together as application providers seek to leverage their existing customer bases
- IT and network infrastructure are converging.

In some cases, traditionally domestic markets for services like retail, voice and video entertainment have expanded into international markets for applications that deliver these services.

Digital technology is the enabler of these trends. It is the changing underlying economies of scale and scope, and driving service providers to restructure their businesses to capture these new economies. New patterns of supply chain integration are the result.

These changes to the patterns of integration are shifting the location of market power, eroding some traditional bottlenecks but creating new ones. This is affecting the balance of bargaining power between different suppliers and consumers. The new-found power of device manufacturers, which has emerged only over the last five years, is a case in point.

Finally, these changes are also eroding the traditional points of policy intervention that governments have relied upon to protect consumers. The globalisation of the application market and the challenges for community standards regulation is a clear example.

3 Supply chain trends: top-level assessment

3.1 Key findings

The distinction between an application (which runs over a network) and an underlying network infrastructure is crucial to understanding how communications and media industries are changing. A key feature of the emerging infrastructure is that it delivers a single global standard Internet protocol (IP) that can support an infinite number of different applications. No knowledge of the underlying network is necessary for an application to be developed and run.

This has freed the innovators who develop applications from the need to control infrastructure, and has freed consumers to choose applications independently of their infrastructure provider. The traditional category of "service" is splitting into "infrastructure service" (the IP data carriage that supports communications and media) and "application services" (the computer programs that deliver communications and media to consumers).

For the purposes of this report "infrastructure" activities include what telcos currently do in the provision of IP and lower level transmission of data, along with cloud providers who provide basic elements of networked IT such as computing power, storage and other shared resources. "Application" activities are those that exploit the infrastructure to offer services such as VoIP, OTT video, and other "appstore" applications.

The main top-level supply chain trends for the communications and media industries are as follows:

- a trend towards vertical separation between network and IT infrastructure and the applications that operate over the top of this infrastructure
- a trend towards horizontal integration in both infrastructure and applications industries, manifested as consolidation amongst infrastructure providers and bundling of applications amongst application providers
- internationalisation of the delivery of applications, with growing international competition in several application industries such as shopping, games and voice.

These trends do not necessarily mean that the emerging supply chain is completely displacing traditional service delivery. At present, traditional and emerging models are in transition, and the rate and progress of this transition depend on the details of each industry vertical. In some cases, the emerging supply chain will coexist with the traditional for the foreseeable future in a complementary or supplementary mode.

The traditionally clear distinction between communications and media supply chains is eroding as the underlying infrastructure is increasingly shared by a range of different application types. Some of these application types are intermediate between one-to-one and broadcast services, blurring the traditionally clear distinction between private communications and services of public significance.

At the same time, the supply chain is growing more complex as activities are vertically disintegrated and new activities such as IT infrastructure ("cloud" infrastructure and platforms) becomes an input to networked services delivery. This means that we can reasonably talk about three related supply chains:

- a network supply chain, focussed on providing IP connectivity, and consisting of the basic infrastructure and related management activities with the associated technology vendors
- an IT supply chain, focussed on providing IT infrastructure and platforms, and consisting of 'cloud' and managed IT service providers with the associated technology vendors
- an application service supply chain, focussed on providing applications and the related content and software inputs, and consisting of content and software producers, aggregators, and application providers with the associated device vendors.

While revenue models for applications have proliferated along with application types, there is a trend towards simpler pricing structures for infrastructure as data services are commoditised and pressure grows to make infrastructure profitable.

The main losers of market power, with a consequent loss of share of economic value across the supply chain, are traditional aggregators and infrastructure owners. These have seen barriers to entry fall and their outputs commoditised respectively, but the impact varies between industries and types of players. For example, Netflix has challenged the US cable companies in the important category of movies, but has made no impact on their access to sports rights. The position of the cable companies has been eroded, but not eliminated. But the overall trend is for heightened competition.

The main winners have been content and software producers, device providers and consumers. Producers now have access to a larger range of outlets. Some device makers (such as Apple, Google and Amazon) have leveraged their control of device operating systems to build applications ecosystems independent of any traditional infrastructure provider. Consumers have seen a proliferation of choices for applications, though it is also true that certain application ecosystems are becoming more powerful in the consumer market. In summary, market power has shifted from the centre of the supply chain to the peripheries.

Much of the new ecosystems mentioned above are driven by advertising, which is in turn driven by the trade in personal information. This has had unanticipated privacy effects, and there are indications of a growing backlash which could have significant implications for the applications economy in the future.

These changes have important implications for consumers:

- These consumers must juggle a growing number of service providers and revenue models
- The fragmentation and internationalisation of supply chains is eroding traditional privacy, security and consumer protection arrangements
- The fragmentation and internationalisation of supply chains is also eroding traditional local content requirements and community standards protections.

More fundamentally, there has also been a significant (though unevenly distributed) change in the way end users approach the market. There is a shift away from traditional passive identities such as "subscriber" and "audience" towards a more active "consumer" identity.

3.2 The traditional supply chain

The supply chain structure of traditional communications and media services were established at a time when analogue infrastructures were used to deliver services, and this remained the case until the late 1980s. In the case of communications, analogue PSTN infrastructure was deployed around Australia, while in the case of media analogue broadcasting infrastructure supported radio and television services.

Analogue technology was inflexible. The infrastructure was practically identical with the application, and the infrastructure could be used only for that application. This infrastructure was tightly integrated; for example, there was no unbundling of local loops in the telecommunications network, or access to digital channels on the broadcasting network.

To put it into economic terms, there were strong economies of scope between the provision of service, and the provision of the underlying infrastructure. In addition, these infrastructures exhibited significant economies of scale. Significant market penetration was required to achieve returns on investment in the technology.

The result was that the communications and media industries exhibited three major structural features that that characterised their supply chains and set the consumer environment:

- Strong horizontal economies of scale promoted consolidation of infrastructure. The result was the emergence of monopolies or oligopolies within communications and media markets based on their distinct infrastructures. Typically, this feature was reinforced by policy restrictions on market entry designed to defend these economies of scale. This placed considerable economic power into the hands of infrastructure owners; in contrast, the economic power of subscribers and audiences was limited.

  Telstra (then Telecom) was the strongest example of this type of business. In media, the cost of building broadcasting networks, the cost of printing presses and the associated distribution networks, and the cost of creating recognised and respected mastheads imposed significant barriers to entry that resulted in oligopolistic competition. In the case of broadcasting, competition was also limited by licensing requirements, but these requirements were principally used to mould this competition to deliver specific policy objectives such as local content output, rather than change the nature of competition itself.

- Strong vertical economies of scope promoted vertical integration of infrastructure and services. This placed control of product development in the hands of these infrastructure monopolies and oligopolies. Combined with the economic power of infrastructure owners, the incentives to meet consumer needs through service innovation were limited. In addition, control of the network allowed control over parts of the supply chain not actually owned by the main service providers.

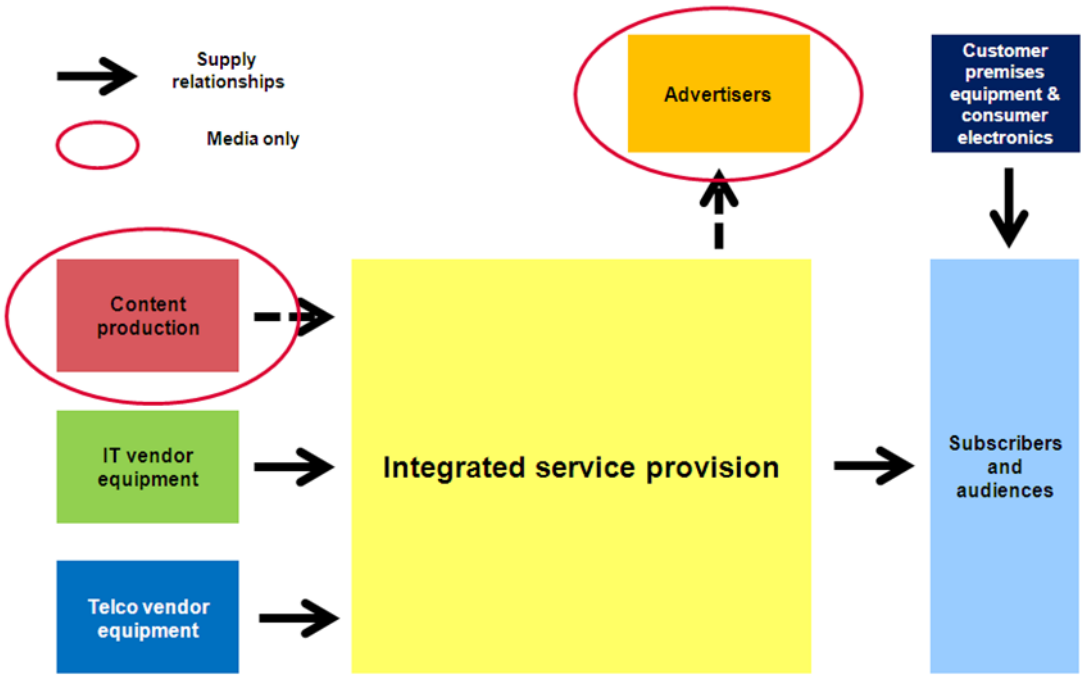
  For example, prior to the 1980s, the entire telecommunications industry was monopolised in Australia. Even the supply of basic consumer premises equipment was a monopoly, and attaching any device without approval as illegal. “Telephone sets” were only leased to “subscribers”, never owned by them. The lack of innovation that resulted was one of the main reasons that the Australian business community began to lobby for competition in telecommunications in the 1970s. In contrast to the telecommunications industry, consumer electronics and basic vendor inputs were un-integrated in media, but everything else was.

- Technological limits to international service delivery, combined with the vertical integration of service and infrastructure, confined communications and media markets within national boundaries and provided protection from international competition. This reinforced the economic power and the control of product development enjoyed by the infrastructure owners.

Because the delivery of traditional applications was tied to national infrastructures, all competition was national. There was no global Internet of the kind we enjoy today, and no global competition for local services.

The associated supply chain for traditional communications and media services is illustrated in Figure 3.1.

Figure 3.1: Traditional supply chain



Source: Ovum

In this industry structure, a monopolistic or oligopolistic market allowed integrated service providers to aggregate both supply and demand, giving them market power over both vendors and producers, and subscribers and audiences. In the case of the communications industry, content was not an input, but in the case of media industry service providers aggregated content and managed the distribution of media services end-to-end. These broad principles also hold for other media industries like music and games. The traditional supply chain for these industries involves the physical infrastructure behind the wholesale and retail chains where traditional media such as CDs and DVDs are sold.

The consumer revenue model was simple but inflexible, and organised around the main industry silos. Communications services were all priced as a combination of an access charge (nominally to cover capital costs) and a usage-based charge (nominally to cover variable costs associated with distance, time, or the use of other resources). Broadcasting services were all "free", funded either by advertising revenue or by government grant. Print media operated on a mixture of commercial advertising, personal advertising, and subscription or "pay per use" for the sale of newspapers. Each model reflected the underlying cost structures and revenue opportunities in the industry.

3.3 The emerging supply chain

Since the 1980s, change in the underlying technology of production and delivery has shifted the economies of scale and scope that dictated the traditional integrated approach. The result is the emergence of a different industry structure and a different pattern of supply chain relationships. This transition is not complete, and for now the traditional and emerging industry structures are in an unstable co-existence. The emerging supply chain will become more important over time, but we do not anticipate the complete disappearance of the traditional model. The final result will vary from industry to industry, but it is almost certain that traditional retail, television, and voice will persist in some form alongside a proliferation of related but complementary applications.

- The first major change has been the digitalisation of the technologies of delivery for communications and media services. Closely related to this development is the spread of the Internet protocol (IP) through the previously analogue delivery networks of these industries. IP has made it economically possible to separate the underlying connectivity that delivers services and the services themselves which are embodied as applications running over these networks.

The result is a trend towards vertical separation between infrastructure and services, manifested in new services such as Voice over IP (VoIP) and IP-based television (IPTV) which can be obtained by consumers separately from the underlying connectivity. The bulk of traffic on core telco networks is now IP, and the terms "telco" and "IP connectivity provider" are increasingly synonymous.

As a result, consumers can find themselves managing multiple service relationships, rather than just one, for the delivery of an end-to-end service. It is possible for providers to bundle these services, but the choice between bundled and unbundled is a matter for consumers rather than the providers.

- The second major change is that the digitalisation of traditional services, along with the emergence of a raft of new digital services. The adoption of a common digital "language" has allowed the consolidation of underlying infrastructure capabilities, and these capabilities can now be used to support a range of digital application types such as voice, video, web and interactive services. The IP network is the most obvious example of such a common infrastructure, but in recent years IT infrastructure, applications and other IT resources have also become available through the IP network as "cloud" services. These generic IT resources, including shared computing power, data storage, and associated application support platforms such as billing, can also be deployed in support of any or all digital services.

This has generated a trend towards horizontal integration between traditionally separate industries.

At the infrastructure level, horizontal integration is driven by the desire to realise of economies of scale and scope through consolidation in both network and IT industries. These economies are due to the low marginal cost of increasing network and IT capacity. In combination with market saturation in developed markets like Australia, these economies are driving the mergers, acquisitions and network sharing that are increasingly common in the telecommunications industry. They are also driving rapid growth of the large established cloud service providers such as Amazon and Google in the IT industry. In addition, many telecommunications service providers now bundle their telecommunications services with cloud services to enterprise customers, drawing the two industries closer together.

At the application level, horizontal integration is driven by the desire to realise economies of scope by delivering bundled messaging, voice, shopping, games, video entertainment and other services from a shared base of IT and content assets. Where applications build

networks between people, as is true for messaging, voice and social media, there are also powerful network effects that have allowed early movers to consolidate large customer bases and achieve strong market positions: WhatsApp, Skype and Facebook are specific examples.

- Finally, the third major change is that the separation of applications from the underlying infrastructure, coupled with the emergence of a global IP infrastructure. This has generated a trend towards heightened competition in application and IT service markets, particularly international competition.

Barriers to entry in the serviced market have fallen, because services can now be deployed independently of infrastructure ownership. In addition, the global nature of the IP network means that all application services are now trade-exposed, including voice, television, education, banking, retail and professional service applications, as well as cloud services such as networked IT infrastructure and business software.

This is raising the level of competition is previously monopolist or oligopolistic markets. Local retailers face competition from online retailers domiciled outside Australia, and local telcos face competition for international voice from Skype. Improvements in international cable capacity have opened up the market for video services, and professional services companies now use networks to deliver advisory and other services remotely. Local cloud service providers are challenged by global providers like Amazon, who have followed up by building local infrastructure to support their local customers.

The one barrier to international competition that remains robust for now is the content licensing regime. The traditional legacy of national content licensing still protects local providers from competition, and enables price discrimination between different markets for content-based services.

These three changes and the consequent trends have created a much more complex service environment. The separation of vertically integrated activities, coupled with the emergence of new kinds of IT infrastructure and new service categories has led to a proliferation of new and specialised service providers. Multiple cloud service providers emerged out of the IT industry, while literally thousands of new applications have been launched. Yahoo and later Google pioneered the new search industry, parlaying the technology into an advertising opportunity. iTunes launched the online music store, and has been followed by a host of online music stores, which are themselves now challenged by music streaming services. Social media services were pioneered by MySpace and later by Facebook.

Added complexity arises from the desire of many of these service providers to partner or even cross-invest. The move of telcos into cloud services has already been mentioned. In addition, aggregators and application providers have worked with IT infrastructure providers (as Netflix has worked with Amazon) to deploy and strengthen their offer. Google, Amazon and Apple have moved into IT infrastructure provision to support their application activities.

Further, the distinction between media services (analogue or later digital) and communication services has been blurred by the emergence of a shared IP network and shared IT infrastructure which can support the delivery of both voice and video applications. At the same time, services have emerged which escape the traditional binary distinction between communications and media. Social media services (such as Twitter and Facebook), while primarily messaging services, operate more on a broadcasting 1-to-many basis instead of the more traditional messaging model with messages being delivered on a 1-to-1 (or at most 1-to-few) basis. This results in a network of essentially mini digital media content producers, and in fact many mainstream media identities have large networks of followers of their messaging content, which is being consumed in an asymmetrical manner.

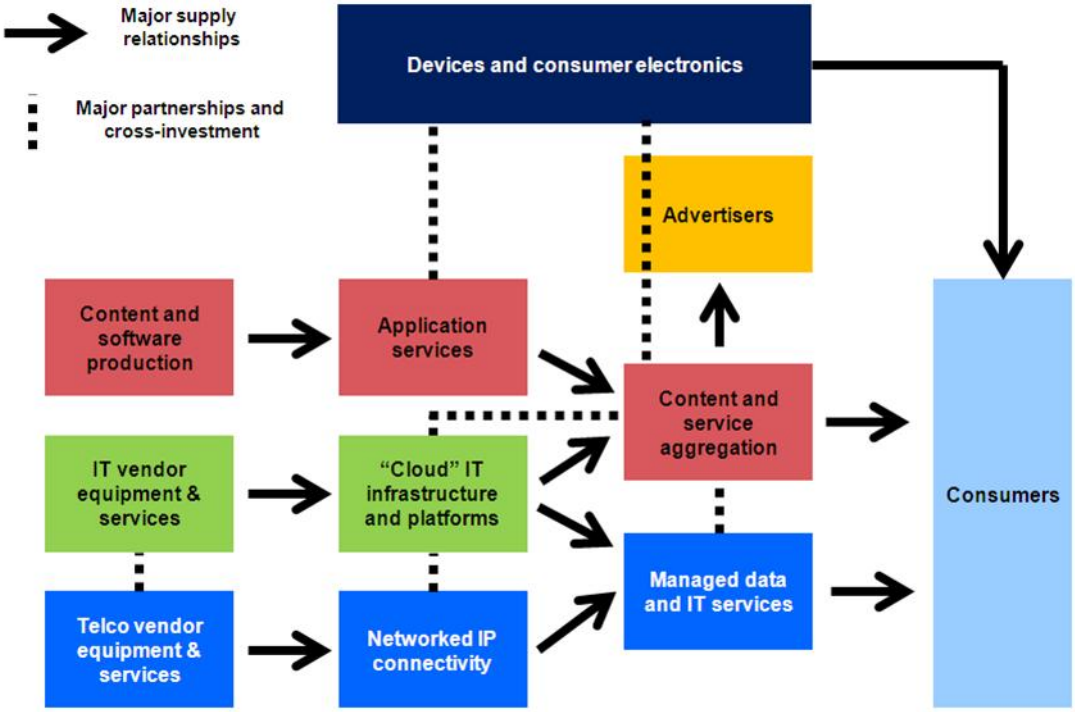
The associated supply chain for emerging communications and media services is illustrated in Figure 3.2. Unlike the traditional industry structure where communications and media

infrastructure and services are separate, the emerging communications and media supply chains share many elements, particularly the network and IT components. This means that we can reasonably talk about three related supply chains:

- a network supply chain, focussed on providing IP connectivity (blue). Players in this supply chain are generally domestic, but are interconnected to global operators.
- an IT supply chain, focussed on providing IT infrastructure and platforms (green). Players in this supply chain may be either domestic or international.
- an application service supply chain, focussed on providing multiple applications and the related content and software inputs (red), and sometimes using cloud inputs and devices. Players in this supply chain may be either domestic or international. Multiple applications operate across a single, underlying IP infrastructure platform.

The first two supply chains is described here as the infrastructure industry, while the third is described as an applications industry. As noted above, the infrastructure industry is broadly characterised by strong economies of scale and service commoditisation, together driving a trend towards horizontal consolidation. The applications industry is broadly characterised by a focus on innovation and by low barriers to entry, offset by network effects that are driving a parallel trend towards horizontal consolidation.

Figure 3.2: Emerging supply chain



Source: Ovum

Examples of the kinds of activities and players present in each of these supply chain elements are set out in the following table:

Supply chain element	Activities	Players
Content and software production	Development of content and television, game and music services. Software development for VoIP and IP messaging.	Numerous app developers, including Skype, WhatsApp, KakaoTalk. Major game producers, television and movie production companies.
Application services	Streaming video, online game offers, music streaming, and music downloads.	YouTube, Blizzard Games, Spotify, Microsoft (Skype).
Content and software aggregation	Apps stores, and music and movie download and streaming services. Cloud-based office software.	Netflix, iTunes, Blackberry app store, Spotify, Google.
IT vendor equipment and services	IT equipment, IT systems integration, and consulting services.	IBM, HP.
Cloud IT infrastructure and platforms	Networked access to virtual storage, server, and application support platforms.	Amazon, Google, Telstra, Optus, Rackspace.
Telco vendor equipment and services	Telco equipment, telco systems integration, and consulting services.	Huawei, Ericsson, Alcatel Lucent.
Networked IP connectivity	Provision of IP access and underlying bearer technologies like Ethernet.	Telstra, Optus, iiNet, AT&T, BT, Orange.
Managed data and IT services	Provision of IP and IT service assurance.	Telstra, Optus, iiNet, AT&T, BT, Orange.
Devices and consumer electronics	Device operating systems. Smartphones, set top boxes, and game platforms.	Google, Apple, Samsung, Sony, Microsoft.

In this industry structure, not all elements are necessarily completely separated. While the provision of IP connectivity and the provision of applications and aggregation are normally dis-integrated in the emerging supply chain, the growth in the IT infrastructure industry, the growth of applications, and the spread of smartphones and other smart devices have generated new opportunities for integration that generate new value for providers and consumers. Some of the more common relationships are represented in Figure 3.2 as dotted lines. This can be done through partnerships, share cross-holdings, or even building new assets:

- Content service aggregators and applications services providers are partnering with or investing in "cloud" IT infrastructure and platforms. Typically this is to support aggregation and application activities that have significant demands for data storage and processing such as video services and application stores

- Some device manufacturers have moved into content and other applications services, and content and service aggregation. The focus here is the handful of device makers that own device operating systems and are therefore placed to build ecosystems around aggregation platforms like app stores on their devices
- Telecommunications service providers are building cloud infrastructure and platforms. Telcos wish to leverage their advantages in the provision of connectivity by guaranteeing end-to-end performance of IT infrastructure and platforms services. Telco equipment vendors are also integrating up into IT equipment and services provision in response to their customers
- Infrastructure providers, particularly mobile providers, are partnering with content and other application providers to guarantee data service quality. Telcos are starting to generate revenue by providing application providers with "class of service" guarantees that improve application performance.

3.4 Competition and innovation

3.4.1. Competition

The vertical separation of the infrastructure, IT and applications supply chains has eroded many traditional competitive bottlenecks.

The vertical disintegration of infrastructure and applications in the emerging model has opened the market for applications to a much higher level of competition. Over-the-top (OTT) application providers that utilise the underlying IP network to deliver services have proliferated, and have generated most of the service innovation in communications and media over the last decade. In addition, we are seeing the emergence of application aggregators who offer a range of applications; this is most evident in the mobile market where applications development is most advanced.

The infrastructure market has also become more competitive, though more gradually than the application market. Since the 1980s, interconnection and wholesale markets have opened the infrastructure market to new network competition. This competition persists in the IP environment, and has been supplemented in recent years by the emergence of IT infrastructure providers who are in some cases integrating these assets into the IP connectivity offer to deliver suites of managed connectivity and IT services. So far, infrastructure consolidation has not become a threat to market competition; rather, it is a consequence of weakening market power.

Ownership of or access to infrastructure are no longer necessary to deliver services, so barriers to entry into the applications supply chain have fallen significantly. The key effect of this change is the reduction of the market power of the traditional aggregators such as broadcasters and telecommunications providers. Traditionally, entry into this activity required significant investment in the related infrastructure, and it often required a regulatory license as well. But the emerging availability of IP infrastructure and the related IT infrastructures has eliminated the investment barrier, while licensing regimes do not capture many new kinds of service. The only thing eroding content producer power is that there are an increasing number of content generators, particularly at the low end of the market.

One result is that the content and software producers have gained in relative market power against traditional aggregators. First, the power of the traditional aggregators has been challenged by new aggregators like Google and new forms of content and software distribution like YouTube and app stores. Second, the wide availability of infrastructure and platforms has allowed some content providers to enter the aggregation and application

businesses themselves. This is visible at both the low and high end of content production; independent producers use YouTube to set up channels to their viewers, while major sporting associations in the United States have developed their own online applications delivered direct to consumers.

The erosion of traditional aggregator power has increased the relative market power of consumers and advertisers. All things being equal, and with more aggregation sources to choose from, consumers and advertisers are in a stronger position. There are two main exceptions to this rule.

First will be those aggregators who have a strong position in devices and can leverage that position into their aggregation activities. Apple, Google and Samsung are examples of these kinds of players, who have the potential to challenge traditional aggregator companies such as broadcasters. The device manufacturers who control device operating systems (called "managed device platform (MDP) providers") are the big winners out of the key trends, and will the main centres of market power in the emerging supply chain. This kind of integrated activity has already consolidated around Apple iOS and Google Android.

Second are those that can use network economies to develop and maintain large customer bases. Social media applications are the best example. With Facebook currently dominating its market segment, it is difficult for any potential new "Facebook" to attract users of their service because there is little value in participation in a new player when most few potential connections are on the incumbent service. As a result, even a player like Google that is dominant is several markets has struggled to reach a critical mass of users for its Google+ social media service; without that critical mass, its social media offer lacks appeal. Twitter and Instagram have similarly achieved dominance in their own segments.

Churn to competing social media services is low, and will remain low because it is impossible for a person to port their social media history to a competitor (though there is strong evidence that inactive accounts are common). This is undermining the competitiveness of the activity. Another source of concern is that social media players and the MDPs are currently exploring partnerships with a view to mutually reinforcing their positions.

In contrast to application-related activities, most infrastructure supply chain activities have been losing market power since the 1980s. This process began when telecommunications monopolies were broken as regulated interconnection and wholesale markets for telecommunications were established. This process received a major boost with local loop unbundling, and it has accelerated as the spread of the IP standard has commoditised connectivity over the last decade.

The IT infrastructure industry is following a similar path to commoditisation, albeit over a shorter timescale. The cloud service model is based on standardised product catalogues and economies of scale, so IT infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS) are typically "vanilla" services delivered to a large number of customers in high volumes. The commoditisation of network and IT services has placed downward pressure on margins in developed markets, leading to a consolidation in these industries, offset to some extent by new entrants taking advantage of lowered barriers to entry. We predict a long-term trend towards consolidation of infrastructure supply chain activities as profitability is increasingly driven by returns to scale.

IT and telecommunications vendor activities have experienced a similar trajectory. The standardisation of equipment and technology over the last decade has commoditised the vendor industries as well, leading to consolidation on a global scale. The rise of Huawei, merger of Alcatel and Lucent, and the withdrawal of Ericsson from the fixed access equipment market are examples of this trend.

The consolidation trend in the IT and network industries is not resulting in greater market power for players in those supply chains; rather, it is a response to the loss of market power driven by standardisation, commoditisation and lowered barriers to entry, and is evidenced in a long-term decline in margins in those industries.

This has again increased the relative market power of consumers against infrastructure providers. With more commoditised connectivity services being offered to consumers, infrastructure providers have fewer sources of differentiation, and less market power despite the trend towards consolidation. In contrast, managed device platforms are gaining market power against consumers as the Apple and Google ecosystems become more entrenched.

Finally, the infrastructure providers are in a weak position against the MDPs and the leading aggregators. With little experience in aggregation activities and a limited legacy of innovation, very few telcos are in a position to challenge the leaders in the applications supply chain. Global experience shows that telcos are strongest in the traditional triple-play format: voice, broadband and IPTV; beyond that, they are relatively minor players in the applications ecosystems. Partnerships with application providers like Facebook generate some shared value. Telcos are most likely to succeed in segments where control of the network is important such as security and other managed services.

This means that telcos must generate enough revenue from their growing data traffic to cover both the costs of operation and the capital investment needed to cope with the rapid growth of this traffic. Traditional telco revenue models are giving way to a more pricing structure more oriented to traffic volumes than voice calls.

3.4.2. Innovation

Levels of innovation have risen steeply in aggregation and applications. This has largely been enabled by the separation of applications and infrastructure, which meant that a new application could be launched without having to build a new network. As a result, many new kinds of application services have been developed, ranging from new kinds of voice and video services, to online retail and banking services, to social media services. Levels of competition in the markets for such services have risen as new entrants contest for consumer attention and revenue. Many of these new entrants, such as Google, Skype, Amazon, Twitter and Instagram, were unknown as little as ten years ago.

At the same time, the complexity of the service environment has grown. In the traditional supply chain structure, consumers managed a small number of commercial relationships. Typically, they had one telecommunications provider (with a billing relationship), several broadcast providers (with no billing relationship), and a subscription relationship for print media.

In the emerging supply chain, consumers must manage a larger number of service relationships. In particular, managed data services on the one hand, and applications on the other, are generally provided by different players (though there are exceptions when services are bundled). But in the absence of full horizontal integration in the application space, there are also multiple application relationships to be managed by consumers. Some of these relationships are simple, as for advertising-supported search and social media which only require registration, while other subscription-based or pay-per-use services such as music streaming, movie downloads and games are more complex and have financial implications.

This does not cause problems by itself; after all, many consumer markets are complex. But undoubtedly, the overall trend is a growing information asymmetry between the consumer and supply sides. This is reflected in the length of many Terms of Use documents associated with applications, but even close scrutiny of the Terms do not always reveal their full implications to consumers. In addition, ; supply chain coordination problems in the

management of consumer information and consumer rights are more likely because supplier responsibility for privacy, security and consumer protection matters is increasingly divided in a complex supply chain. The internationalisation of the applications market further complicates this picture, because providers based in different country markets can be subject to different legal requirements in these matters.

On the demand side, the traditional categories of "subscribers" and "audiences", with their associations of passivity, are giving way to a more active "consumer" identity for users. In practice, different segments of the community are better or worse prepared to adopt this new identity, a fact which has implications for the consumer impact of these changes.

3.5 Consumer implications: top level assessment

3.5.1. Revenue models

The proliferation of service providers is mirrored in a proliferation of revenue models. Consumer communication services have traditionally been provided on a subscription based model, usage based model or a combination of both. In contrast, music and video services have long operated on a mix of payment based models and free advertising based models. These include:

- free-to-air broadcasting of music and video content supported through advertising;
- free-to-air broadcasting of music and video content supported through taxes collected and distrusted by the government (public broadcasters);
- subscription video services such as pay-television;
- physically packaged content sold on an ownership basis (music albums and video DVDs).

These revenue models persist in the emerging industry, but often in new combinations.

The revenue model for basic access to managed data and IT services for consumers remains very similar to the old communications revenue model, with a monthly charge for access plus a usage based charge.

The revenue models for applications are much more diverse. They include the traditional subscription and advertising supported models, along with intermediate models such as "freemium" schemes that involve a free or advertising supported core service, with an option for subscription or one-off payment for additional services. An example of a subscription approach is Netflix, which imposes a fixed monthly fee for access to its movie database, while Google search and email services are supported through advertising. There is a great diversity of approach; for example, some VoIP services (which are a partial substitute or complement for traditional PSTN services) can be obtained "free" on an advertising supported basis.

Advertising supports many of the "free" applications. One important difference between advertising in the traditional supply chain and advertising in the emerging supply chain is the use of personal information to improve the effectiveness of advertising messages. Over the last two years, the use of this data has advanced rapidly. Advertising exchanges have gone from selling undifferentiated blocks of thousands of "eyeballs" to valuing and selling individual eyeballs on a buyer-by-buyer basis. This valuation is performed by processing the personal data generated by the consumer's use of applications online to determine how well the consumer's profile corresponds to the buyer's target market.

3.5.2. Privacy, security and consumer protection

The primary privacy issue arising from the emerging supply chain is the digitisation of private information, and the ease with which this information can be collected, analysed correlated with other data sets. This is allowing owners of databases to gain unprecedented insights into consumer behaviour and preferences. Any service that is provided on an advertising-supported free to the consumer basis is operating a two-sided market. These service providers want to maximise their user base (downstream customers) in order to attract advertisers (upstream customers). The key is balancing the demands of the upstream customers for more detailed user information for better advertising targeting with the privacy concerns of the downstream customers.

In some cases, this is a simple tradeoff made by the consumers themselves, who provide information in order to be supplied services which better suit their needs. But the implications of providing information are not readily apparent in all cases, particularly when "big data" techniques are used to add an unexpected significance to personal information.

This will require transparency and tools for consumer control of information, but these cannot be effective unless consumers fully understand the implications of Terms of Use agreements. "Informed consent" is a problematic concept when the decision is not to use the service at all, or to accept the corporate-written (take-it-or-leave-it) 'contract of adhesion', often up to 10 pages of A4, written in legalese, and buried several clicks into a website.

There is undoubtedly a tension between the widely appreciated benefits of advertising-supported services and fears about the uses of personal information. There is survey evidence that most (though not all) consumers are relaxed about the use of personal information, provided they get something in return, but attitudes to the collection and sharing of personal information are still fluid. Nearly 70% of respondents to Ovum's Consumer Insights Survey said that they would use privacy controls to block the collection and use of their data if these were available. If even half of these "privacy advocates" blocked the collection of their data, the evolution and reconfiguration of the personal data ecosystem into a highly interconnected data-sharing network would be heavily disrupted. Advertisers could lose sight of consumers as audience segments are thinned out or even appear to vanish entirely. The analytics industry and the high-profile data collectors (Google, Facebook, Microsoft, Apple, and Amazon), the so-called "data primes," could see their prized Big Data insights devalued as the statistical validity of their real-time correlations is weakened.

Much will depend on how the users of this information conduct themselves. This form of advertising has led to some cases of personal information being released, notably one high-profile case where some American parents became aware their daughter was pregnant only when they began to receive marketing collateral for baby equipment. It is one thing to agree to Terms of Use that allow the collection and use of personal information. It is another to see the consequences of that choice, which may not become apparent for months or even years.

The internationalisation of the application and IT supply chains has also facilitated the transfer of personal information out of the domestic market, raising jurisdictional issues in the treatment of domestic privacy rights. These issues have been addressed to date through a mixture of domestic regulation and contractual agreements between domestic and international operators. As the collection and sharing of personal data grows, a different and more direct approach to the large global aggregators of personal data may be needed, but this will require international privacy policy coordination.

There is a great deal at stake in this issue. Consumers' personal data is the fundamental currency that enables the operational efficiency, strategic planning, and revenue models of Internet businesses and underwrites the sustainability of the Internet economy itself. Ovum has investigated the underlying trends, dynamics, and ecosystem of the personal data

industry and our Consumer Insights survey has identified some hardening of consumer attitudes towards privacy which could lead to the emergence of stricter regulations. If realised, these forces have serious implications for the Internet economy in general and the CRM, advertising technology, and Big Data industries in particular.

Europe is currently planning an upgrade of privacy laws that could enforce 'explicit consent' for the collection of personal data and other countries could follow with similar regulation. But the commercial privacy market is not waiting for regulation and is already offering consumers the tools to block a range of data extraction techniques. Unless regulation is introduced soon the escalation of counter-measures between data collectors and users of advertising supported services could increase to the point of 'privacy warfare'.

Whilst Europe is taking a top down approach, the US is taking a standards-based bottom up approach as illustrated by the W3C DNT (do-not-track) initiative. The DNT scheme will allow consumers to set information tracking preferences in browsers and other applications, to which web and other applications providers can respond. This shows that government intervention is not the only option. However, a Senate committee in charge of overseeing the initiative appears not to be happy with progress, so a federal solution could still result. It is certainly the case that consumer need to not just be made aware, but also helped to make a more informed decision and perhaps appreciate that the sharing of their personal data is a trade-off required for the services received.

The security of networks and IT devices also takes on a new complexion. The new supply chain is both powerful and complex, and there will always be bad actors who wish to exploit consumers' unfamiliarity with the systems. The ubiquity of spam, phishing, and malware at the application level of various kinds is testament to this fact.

At the infrastructure level, we see a medium term trend towards the "software defined networks (SDN), in which an increasing number of network elements will be defined and managed from centralised telco IT infrastructure by the telco. This kind of network has opportunities for intrusion that traditional networks did not have. The new control interfaces and application programming interfaces (APIs) that these networks contain and which are used to control network operation are increasingly standardised, and are therefore increasingly accessible. Close attention to the security of these SDNs will be essential.

Consumer protection against poor service is also becoming problematic. There are more services available, and a growing diversity in the expectations of different kinds of services, with some services offering only a "best efforts" quality. Service delivery responsibilities are increasingly fragmented across different supply chains and players, some of whom lie outside domestic legal jurisdiction.

3.5.3. Universal service, local content and community standards

The dependence of many new services on IP connectivity has raised the importance of access to broadband. Over the last five years, governments around the world have begun to promote access to broadband on a national scale. For example, Australia, Singapore and New Zealand have seen substantial public funds committed to fibre rollout. In 2007 Malaysia initiated a national broadband project, the National Broadband Initiative, in partnership with Telekom Malaysia. In 2010 the FCC unveiled "Connecting America: The National Broadband Plan" to Congress. In Europe, countries including the UK, Germany, Spain, France, and Portugal have made financial commitments to support high-speed broadband rollout in recent years. There is a growing commitment to spreading the benefits of broadband, and preventing the emergence of a digital divide.

This commitment has taken different forms in different countries, and no dominant model of broadband promotion has emerged. Investment on the scale required can only be achieved

with by mobilising significant public and/or private funds. At the same time, the effectiveness of traditional universal service arrangements, including arrangements for access to emergency service calling, are challenged by the separation of voice services (particularly VoIP) from the underlying infrastructure and the growing list of services considered essential in modern society. Emphasis is shifting away from the traditional focus on voice services, and onto securing consumer access to basic connectivity at a speed and quality suitable for participation in the emerging supply chain. This is reflected in the number of countries now focussing on improving broadband access.

Related issues have arisen in cultural and social spheres. The separation of content activities from the underlying infrastructure, and the proliferation of new kinds of content-based services apart from traditional linear programming, have undermined traditional controls on local content and community standards by placing many aggregators outside the reach of regulation. It has also undermined the effectiveness of infrastructure as a point of intervention for content regulation, because the infrastructure providers is mostly not the content provider and have little control over which applications are used by consumers. These trends expose consumers to content issues that they would traditionally have not needed to manage. This manifests another aspect of the general trend away from a passive "audience" towards a consumer identity.

4 Supply chain trends: the role of infrastructure and devices

4.1 Key findings

There is a strong trend towards disintegration of the traditional vertically integrated infrastructure supply chain. The provision of voice and media services is increasingly divided between the provision of a basic shared infrastructure, and the provision of the services that run over the network as applications.

At the same time, there is an overall trend towards consolidation *within* the various elements of the infrastructure supply chain. This is driven by principally by falling margins associated with competition and commoditisation in network and IT services. An overall shift of market power away from traditional bottlenecks since the 1980s has been driven by the growth of mobile technology and the spread of regulated wholesale markets throughout the industry.

The infrastructure industry is supplemented by the cloud infrastructure services industry. The basic value proposition of this industry is to shift IT investment out of household, enterprises and government and to consolidate computing power, storage and application management platforms into specialised providers. This is achieving significant economies of scale which is driving rapid price reductions. The standardisation of these services will drive further commoditisation and pressure on margins which will accelerate this consolidation.

Supply chain relationships have become more complex as the supply chain has fragmented. Some IT infrastructure companies operate independently, but some telcos are also integrating IT services into their service portfolios to deliver managed network and IT services. IT infrastructure companies also have partnerships with some major content aggregators and applications providers, and in some cases content and software aggregators are also integrating IT infrastructure.

IT infrastructure will be incorporated into telecommunications infrastructure offers in two ways. Telcos are offering IT services as value-added services offered over IP networks. More fundamentally, data centres inside telco networks will increasingly be used to define and control network elements, allowing telcos to rapidly set up and take down new telco services. This will have significant implications for the security of networks which must be managed.

The most powerful emerging companies in the emerging supply chain are managed device platform (MDP) companies. These are strongly branded companies that combine device and cloud infrastructure to create powerful application ecosystems that attract content and software developers and consumers. Apple, Amazon and Google are all pursuing this model.

The long term trend towards consolidation in the telco and IT equipment vendor industries will continue, driven by competition and the commoditisation of network and IT technology. The distinction between telco and IT vendors is becoming blurred as these vendors strive to widen their portfolios and meet the demands of infrastructure companies that play in both network and IT spaces.

4.2 The traditional infrastructure supply chain

As discussed in the top-level analysis of the previous section, the infrastructure and the service in traditional supply chains were heavily integrated. For practical purposes, the infrastructure was the service and the service was the infrastructure. This resulted in a high level of vertical integration, but little horizontal integration, across different

service/infrastructures. These multiple independent supply chains operated as separate industries:

- Fixed voice services were provided over circuit-switched PSTN (telephony) networks, with the service being sold by the same organisation that built, owned and operated the infrastructure
- Radio and television broadcast services were provided by organisations that largely controlled their own content acquisition and production facilities, channel programming, distribution networks and broadcast transmission towers operating on their own allocated spectrum band
- Print media also controlled its own content acquisition and production along with its printing facilities, and had its own set of distribution channels.

Traditionally, telecommunications has operated as a monopoly in most countries. This was due to a combination of historic factors:

- Growth of the telecommunications service from the telegraph service provided by the government postal service
- High levels of funding to establish the network, often provided through government sources
- Strong network economies resulting from the number of potential network connections within an existing network in conjunction with the absence of regulation requiring interconnection to competing networks
- Service–specific infrastructures, which prevented convergence between different industries.

Traditionally, broadcast media has operated as domestic oligopolies, with the number of operators controlled by government licencing in conjunction with access to the spectrum rights necessary for transmission of the audio or video signal.

In both cases, the market power associated with the control of monopoly or oligopoly infrastructure and other assets (e.g. spectrum) allowed service providers to leverage market power into upstream vendor markets and downstream advertising and subscriber markets. For example, in the early history of telecommunications, the telecommunications operator had full control over all network infrastructure including the subscriber equipment installed in the customer premises (the telephone). The subscriber telephone was typically leased from the telecommunications operator rather than owned outright. The telecommunications operator would purchase equipment (both network and subscriber equipment) from vendors specialising in the telecommunications market. In the United States, the telecommunications network operator, AT&T, also owned the sole supplier, Western Electric, of all telecommunications equipment. These kinds of arrangements remained in place in the United States until 1968, when the courts ordered AT&T to allow independent subscriber equipment to connect to its network in the Carterphone decision. This change did not occur in Australia until well into the 1980s.

Within the broadcast media industries, there has been competition in the production and provision of receivers (such as radio and television sets) since the introduction of transmission standards and consumers have been free to choose and purchase their own equipment. The subscription television industry (such as distributed through HFC cable networks in the United States) took a different path which more closely resembled that of the telecommunications industry.

In both the telecommunications and media industries, the service has been tightly constrained by the infrastructure capability. Changes to the service traditionally required

changes throughout the network and customer premise equipment, slowing service innovation.

As is discussed is Section 3, recent trends such as increased data access speeds to the customer and separation of services and infrastructure through IP are driving fundamental changes not just to the telecommunications industry, but also allowing greater convergence between related industries such as media content.

At the same time, the emergence of the IP network has enabled the provision of networked IT infrastructure, described as "cloud" infrastructure, that can be used to add value to both network and application offers. Cheap and accessible computing power, storage and application management platforms are transforming the infrastructure industry into a software-defined platform for innovation.

4.3 The emerging infrastructure supply chain

The way that network and IT services are implemented and delivered is still developing, but the broad outlines of the associated supply chain are emerging. This emerging infrastructure supply chain differs from the traditional in two key ways:

- The spread of the Internet Protocol (IP) is merging separate networks into a single platform capable of supporting a potentially unlimited numbers of applications.

The Internet Protocol hides the underlying details of different network technologies allowing data packets to be carried transparently (encapsulated) across network boundaries, acting as the core connectivity technology for the Internet. IP operates on a connectionless basis, with the Transmission Control Protocol (TCP) providing connection orientated functionality, including reliability of transmission.

This is reducing barriers to entry to the telecommunications industry. In the traditional infrastructure industry, a new entrants setting up interconnection between networks typically required either multiple interconnection agreements or paid an established carrier for transit to other networks. The packet-switched nature of IP connectivity means that an IP entrant only needs to peer or interconnect with one other IP connectivity provider, and the data packets will always get through. The bulk of traffic on core telco networks is now IP, and the terms "telco" and "IP connectivity provider" are increasingly synonymous.

in addition, any application that is created to run over IP (or TCP/IP) can be launched on the global Internet without requiring changes in the underlying networks or customer devices, and importantly, without requiring permission from the owners or operators of the intervening networks. An early example of this was when Tim Berners-Lee created the World Wide Web to run over the existing Internet.

- The emergence of networked IT resources (cloud services) that can interface with this network allows producers, aggregators and application developers to take advantage of cheap, standardised computing, storage, and applications management platforms (e.g. databases, web servers, and security systems) to accelerate innovation.

At its core, a cloud service is an IT service delivered via IP connectivity. Typically, end users are unaware of the underlying architecture and data centre resources that support the service. This section will focus on "public cloud" services delivered using the resources of a third party such as Amazon, Microsoft Azure, or Telstra. These services are typically available off a fixed service catalogue shared by all users.

This standardisation of services is key to the cloud business model: scale deployment of a standard set of IT services off a service catalogue, which allows providers to share the fixed costs of equipment and development across large customer bases and drive down prices.

Cloud computing is the "model T" of information technology: customers can have any flavour of service they like, as long as it is vanilla.

There are several kinds of cloud services. The three main kinds are:

- Infrastructure as a service (IaaS). Services that replicate hardware such as virtual servers and storage, networking technology and data centre space.
- Platform as a service (PaaS). Services that allow a developer to build an application. These include databases, web servers, identity management services, billing services, and application development tools.
- Software as a service (SaaS). Applications that run on the network, such as CRM applications (e.g. Salesforce.com), email, virtual desktops, games, video stores, voice communications and messaging. Typically, these interact with a client application e.g. a web browser.

Cloud services therefore turn computing activities into flexible utility services that can be consumed on-demand and paid for on a usage basis. This relieves the users of the need to build their own servers, storage, and application support tools, which reduces capital expenditure. It also facilitates innovation by avoiding lock-in to large capital bases, because cloud services can be purchased and discarded on a short term basis, and scaled up and down according to customers' varying requirements.

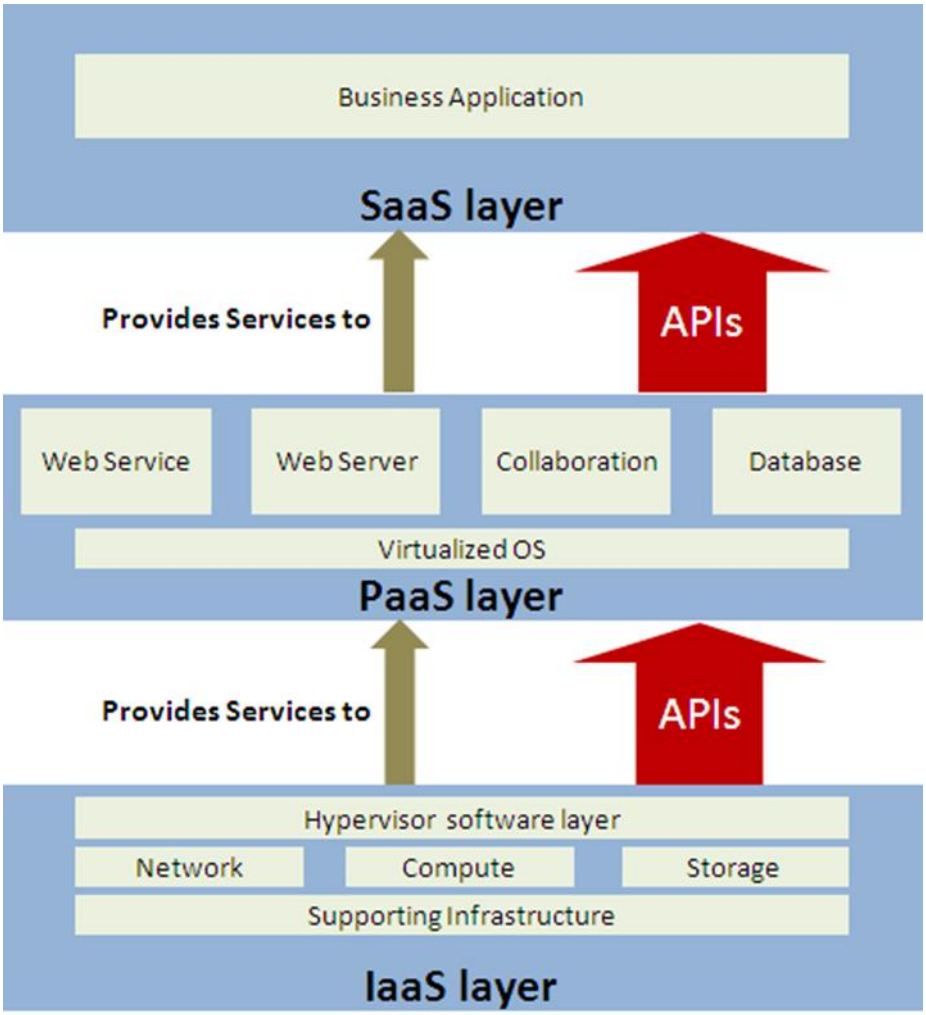
These two key differences are combining to produce a third; the "virtualisation" of the telcos' IP connectivity networks as network intelligence is increasingly centralised in internal telco data centres. In this so-called "software defined network" (SDN), it is possible to dynamically define the function of key network elements, from antennas and NTUs through to the core network, allowing the rapid deployment of new managed data services. The SDN is the final consequence of the digitisation of the network, involving all of the elements of the infrastructure supply chain.

Another area of renewed market power is the device market. A decisive difference between the traditional and emerging supply chains is the importance of the new smart devices. However, these smart devices are not important simply as devices, but as elements of wider applications ecosystems that include third party content and software developers, aggregators, and applications management platforms based on IT infrastructure. Critical mass effects in these ecosystems are entrenching device players as the most powerful players in the emerging supply chain.

4.3.1. Cloud IT infrastructure and platforms

Cloud services are all based on equipment and software installed and developed by cloud service providers. The equipment includes storage, processing and network hardware and is often provided by IT vendors. The software uses the hardware as an input, turning it into virtual servers and storage which are made accessible over the Internet. The creation of this software, which "abstracts" the underlying hardware to create a simple and accessible service, is the core competence of cloud service providers. The user of cloud services does not need to know any details of the hardware, including its location. The service delivery model for cloud services is illustrated in Figure 4.1.

Figure 4.1: Cloud service delivery model



Source: Ovum

One of the enablers of this model is the fact that the services are provided in a modular fashion as web services with transparent and consistent application program interfaces (APIs). APIs are simply standard protocols for accessing a particular IT service. APIs are "published" by service providers and are available to all of their customers. The use of standard APIs allows providers to build scale and reduce marginal costs, which can be passed on as lower prices.

Amazon executives sometimes refer to Amazon Web Services (AWS) as an 'API business' to make this point. The APIs are the key to the explosive growth of cloud services because they enable customers to consume cloud services, passing data back and forth and integrating to other applications, without needing to know the technical detail of how they work 'under the hood'. This process of abstraction is the key benefit of APIs. They enable the creation of large ecosystems of cloud providers and independent software vendors that are able to interoperate to deliver a seamless customer experience.

Public cloud services bring two main benefits, both of which are attributable to the "radical externalization" of ICT capabilities beyond enterprise boundaries. First, they offer a more effective and efficient way to source selected ICT-enabled business processes, applications, and infrastructure. Second, they offer a new way to accelerate participation in the rapidly evolving social networking and mobile solution ecosystems of the Internet age. Public cloud

services in particular are part of a broader Internet-age trend, away from information being "locked away" inside the enterprise network and toward the emergence of information ecosystems that transcend organizational and national boundaries.

This IT infrastructure industry participates in the communications and media supply chain in several ways:

- Telcos are increasingly investing in public cloud infrastructure to add value to their managed data offers and generate new revenues streams
- Leading application providers such as Amazon, Google, Microsoft and Facebook use IT infrastructure to support their aggregation and application activities. Some have parlayed these into public cloud offers; Amazon is an exemplar of this approach.
- A variety of IT-based infrastructures such as Akamai's content delivery network (CDN) continue to operate on a standalone basis.

It is in the nature of Internet delivered cloud services that they are ubiquitously available throughout the world from any location. There are thus thousands of companies large and small that could provide cloud services in the Australian market from overseas locations. Some of the noteworthy IaaS or PaaS vendors, however, include: GoGrid, Google and Rackspace. Rackspace, in particular, is a global leader in the IaaS business and has recently established a data centre in Sydney.

The clearest exemplar of Infrastructure-as-a-service (IaaS) is Amazon Web Services (AWS) – which was the first company to launch a public cloud IaaS offering and remains the global leader in this category. Amazon Web Services has, to a large extent, defined the terms IaaS and PaaS and continues to set the pace of innovation in cloud services. It is useful to use AWS as the clearest illustration of what makes cloud services different to other ways of delivering and sourcing ICT capabilities.

AWS established an availability region in Sydney in 2012, with two availability zones for redundancy, so it is also a good example of a global cloud services provider combining the benefits of both global scale and local operational presence. Australian companies can choose to run their applications on AWS with the data residing entirely in the Sydney availability region – and accessed over private telecommunications links if desired. This blurs the boundaries between so-called 'public' and 'private' cloud services – AWS is a public cloud provider that also provides dedicated resourced and secure network access.

AWS also provides a range of PaaS capabilities to provide an environment in which applications can be built and run – using both customised programming and assembly of pre-existing web services components and applications. The AWS service catalogue includes one of the most complete range of web services of any vendor and defines the 'state-of-the-art' for IaaS and PaaS. Amazon services are an input to many communications and media businesses in the merging supply chain, notably Netflix and Skype which are both the subject of a case study in this report.

Most IT services companies with presence in the Australian market have had to respond to competitive pressures and customer demand to add cloud services to their existing managed services and outsourcing offerings. IT companies in Australia that have extended into cloud IT service provision include Dimension Data (NTT), Aptira, Bulletproof Networks, Datacom, Fluccs, Interhost, PacNet and UXC Connect. Services offered typically span the full range of website and application hosting, managed services, co-location, network services, software development, and systems integration and consulting services. IaaS is most typically provided by these companies on a private and hybrid cloud basis – blurring the distinction between 'in-house' and 'outsourced' ICT capabilities in response to the requirements of enterprise and SMB clients.

A separate group of vendors are those that have either founded their companies in the post-cloud-services era or have decided to make cloud services the main focus of their business. Their offerings are primarily or total based on IaaS. These leading Australian-based cloud services specialist providers include companies such as 6YS, Cloud Central, Dynomesh, InfoPlex, OrionVM, True Cloud Solutions and VMVault.

Finally, cloud services are a logical extension of the telecommunications network, and telecoms companies have been at the forefront of the development of large-scale cloud services in the Australian market. Most telcos have been offering a range of managed telecoms services to large and small business customers for many years, and have extensive network and data centre infrastructure located throughout the country. The leading Australian-based telco companies offering IaaS include AAPT, AmComm, Macquarie Telecom, Optus and Telstra. The logic of telco involvement in IT infrastructure and services is that the network is a key determinant of cloud performance, so an integrated offer will be superior. This is a plausible strategy, though the telcos have yet to demonstrate significant differentiation from other IT service providers.

A more detailed description of the Australian cloud services scene is in the Attachment to this report.

PaaS services are increasingly using IaaS services as inputs, and SaaS services are increasingly running on either IaaS or PaaS services. As a result, the ongoing success of SaaS is driving usage of PaaS and IaaS, and vice versa. Similarly, IaaS and PaaS drive each other's growth. This synergy is one of the reasons why large companies, such as AWS, Microsoft, and Google, are now spanning the entire IaaS, PaaS, and SaaS spectrum, driving horizontal integration in the cloud services industry.

An increasing number of cloud-centric companies are making services available via published open APIs for third parties to build on. These mix-and-match capabilities are strengthened by an increasing number of partnerships between IT service providers and application providers, forming increasingly intricate ecosystems. For example, the partnership between Salesforce.com (the leading PaaS/SaaS provider in CRM solutions) and Facebook allows the sales and marketing functions that use Salesforce to easily reach their customers on Facebook. The more services and related APIs that are available, the greater the usage and more diverse and robust are the ecosystems that sustain cloud providers and their customers.

However, these APIs have generally been proprietary until recently. VMware dominates the IaaS market from an inside-out perspective, expanding from private to public clouds. AWS does so from an outside-in perspective, expanding from public to private clouds, both directly via its virtual private cloud offering and via its Eucalyptus Systems for private clouds. The two companies dominate the IaaS market to such an extent that most of their competitors have decided against tackling them on their own. Instead they have sought to combine forces within the context of open source projects in order to differentiate themselves as "open" and create a viable base of customers with sufficient scale to challenge Amazon. These efforts are still at an early stage.

For example, Rackspace launched the OpenStack open source project to compete against AWS, and Abiquo, Eucalyptus, and Joyent have open-sourced their technology with a view to compete with VMware and/or AWS. The objective of their open source software (OSS) offering is to attract third parties that will unite their efforts to catch up with more established solutions, in order to attract partners to strengthen the technology and enable it to attract further partners. For users of cloud services, open definitions for APIs mean that cloud suppliers will be substitutable, preventing supplier lock in.

Open source opens up all cloud markets, not just the IaaS market. VMware, owing to its status as a server virtualization giant, has no incentive to open source its technology. On the

other hand, VMware has open-sourced its Cloud Foundry platform-as-a-service (PaaS) technology in order to elbow its way into the PaaS market. We expect to see more such services and a more competitive cloud services industry.

4.3.2. IP connectivity and the software defined network

This supply chain activity does not include the traditional voice application; rather, it involves the underlying transport of IP data that underpins all application activity in the emerging value chain. The separation of this IP connectivity from aggregation and applications means that the focus of this industry is the delivery of managed IP data products purchased by consumers and other end-users. Based on IP protocol, these services are managed in the sense that telcos have agreed to meet quality and class of service standards. These services are underpinned by layer 2 broadband access, and may be offered either on a retail or wholesale basis. This section therefore focuses on the infrastructure and service elements needed to deliver these services.

IP is quickly becoming the dominant data carriage protocol. We acknowledge there will remain non-IP network infrastructures for at least the next decade – including private and leased lines, legacy voice and broadcast video networks, wavelength services, and dark-fiber leasing, primarily for wholesale or point-to-point applications – and that not all network traffic needs to pass through IP routers. However, traffic on Internet-based "any-to-any" IP networks is rapidly accelerating and already represents the lion's share of network capacity.

One key driver for this migration is video, and the bandwidth demands that non-broadcast video places on a network. With cloud- and video-centric applications driving continuing IP traffic growth and competition from over-the-top (OTT) service providers, carriers are seeing continued pressure on revenues and margins. Fortunately, modern IP routers have the capacity to route packets at terabits per second from any source to any destination. What these IP routers need is abundant and economical bandwidth connectivity to each other, using high-speed layer 2 Ethernet interfaces in new, and flatter topologies. Putting this into place will impose significant capex requirements on telcos over the next decade.

This is happening at a time when telcos face significant pressures. Most telcos face flat to declining revenues, putting their cost base under pressure. For telcos representing over 90% of the global market, revenues and capex both dropped by roughly 1% in 1Q13 versus 1Q12 (YoY). The telcos with the slowest growth were also among the largest: Telefonica, FT Orange, Telecom Italia, and KPN. A weak European economy and ongoing cuts to mobile termination rates are the main causes. Exposure to emerging markets is no guarantee of growth, either; America Movil's revenues grew just 0.2%, for instance. Some were more successful; Verizon, Softbank, KDDI, Comcast, and Time Warner Cable grew well in 1Q13 despite their size. NTT grew revenues by 2%.

The pressure is partly due to toughening competition regulation and new competitive threats – both OTT and traditional - but the underlying enabler is the commoditisation of telecommunications. This is caused by the spread of the IP protocol and of standards including Ethernet into the public network. This is creating further, powerful pressures to find more efficient ways to build and operate networks and to differentiate network-based services.

The biggest consumer-related challenge telcos face is to fund significant capacity upgrades to handle rapidly growth in IP traffic while avoiding the need to either ration traffic capacity or raise prices for consumers and business customers. There is therefore significant pressure to find ways to expand capacity faster and more cheaply in order to prevent either capacity issues for consumers or higher retail prices.

Telcos are also looking for ways to differentiate themselves in a market where traditional voice and data services are being commoditised. They therefore need ways to adapt and customise the function of their networks to meet customer requirements, whether those customers be resale operators, businesses or consumers.

One example of a telco responding to these pressures is AT&T. Project Velocity IP's (VIP) aims to move AT&T toward a virtual all-IP network across its wireline and wireless footprints. The project has a three-year timeframe for completion. AT&T expects that by 2016 approximately 90% of its total service revenues will come from IP traffic, up from 81% in 2012. This network migration brings significant potential for service and network integration, cost savings, resource optimization, and differentiation from competitors. In fact, AT&T has already begun to explore and exploit many of these opportunities. In many ways, Project VIP is a refined, big-picture collection and organization of a number of ongoing initiatives and objectives, focused on one major strategic objective. Complementing these efforts, AT&T can also build a number of its strengths:

- The Innovation Pipeline, from which many of the company's newest apps, technology, and operational initiatives have come.
- Its eagerness to open APIs on its network to third-party developers in order to generate new services that use and rely on its network, and leverage the new revenue and business model opportunities that come from those activities.
- Its Wi-Fi assets, which it can exploit further for data offload, as a customer value-add, and as a competitive differentiator with both business and consumer customers.
- New commercially launched platforms, including its M2M developer platform, its healthcare developer platform, and its mobile payments platform.
- The large and growing number of connected devices such as e-readers, navigation systems, gaming systems, and connected cameras that are using its network; these increase the addressable market to which the company can sell its integrated all-IP offer.

The deployment and coming dominance of IP connectivity is associated with the growth of IT infrastructure. IT infrastructure plays two distinct and complementary kinds of role in the overall infrastructure supply chain. As noted above, networked cloud services are emerging as an important service category for telcos, particularly in the enterprise and SMB markets. These IT services are typically offered as value-added services offered over IP networks.

But more fundamentally, IT infrastructure concepts are now being integrated into IP network infrastructure as the operation of the various programmable network elements can be defined and managed from centralised telco-specific IT infrastructure. In this so-called "software defined network" (SDN, also known as the "virtualised network"), telco IT infrastructure can be used to dynamically define the function of key network elements, from devices and NTUs, access and aggregation, edge, core, and data centres, allowing the rapid deployment and management of data services. Coupled with packet inspection techniques to identify different traffic streams, this will ultimately allow telcos to manage specific network requirements for applications and users in real time. In contrast, most of today's networks are collections of disparate standalone devices that must be individually configured and lack application awareness or global visibility into network traffic.

This massive addition of new computing requirements leads to a significant need for additional server capacity throughout the telcos' footprint. This also has benefits for the telco cloud offer: with their own facilities spread throughout multiple central offices, telcos can also use those facilities IT infrastructure to bring the cloud much closer to customers, reducing latency and bandwidth costs. With control of the data centre and the network, telcos can guarantee service quality and performance from the data centre to the customer premises.

The new role of telco data centres in carrier networks also leads to additional requirements for inter–data centre connectivity that can be met by more flexible converged optical platforms.

This technology will help service providers adapt to the cloud era by delivering a flatter network architecture that is likely to first be employed to deliver better scalability and lower latency. By integrating optical transport and switching/routing, with management and control layer software, these new products provide an abstraction layer between the physical transport infrastructure and higher-layer software functions. This programmable transport layer can connect to higher-level cloud and virtualization platforms, through application programming interfaces (APIs), for orchestration and network automation.

An application programming interface (API) is a software interface that abstracts the details of underlying resources. APIs are well established in software systems and the IT environment and can take many forms, from the function calls in an operating system to the web-based interfaces that integrate Facebook with custom applications. As networks become more programmable, APIs will be widely employed at multiple network layers to enable software to readily access network resources.

Today, in the cloud environment, APIs are available to make infrastructure, services, and application resources of the cloud data centre available to application developers. However, there is no recognized API standard for cloud computing, and the number of APIs has multiplied as more vendors develop their own, although OpenStack, Amazon Web Services, and VMware's vCloud are moving toward becoming de facto standards.

Fast-growing mobile networks are also generating interest in APIs to exploit the value inherent in network data. With network APIs, customers, suppliers, and third-party application developers can, for a fee, use a carrier's existing processes, platforms, and data to create new applications or services. Network APIs are available from tier-1 carriers such as AT&T, Telefonica, DT, and Verizon to support location information, payment and billing features, multimedia messaging service (MMS), and short message service (SMS) functions.

Network infrastructure APIs are being introduced into many equipment platforms to allow customers, partners, and third parties to build network applications that extend network functionality or modify the behaviour of a network dynamically. Cisco's onePK API and the Junos XML API, for example, provide a representation of the configuration statements and operation mode commands that control their switches and routers to enable a programmable interface to networks. With SDN, controller software will have access to these APIs in addition to other interface protocols to access equipment resources. The controllers will provide their own northbound API to higher-layer functions.

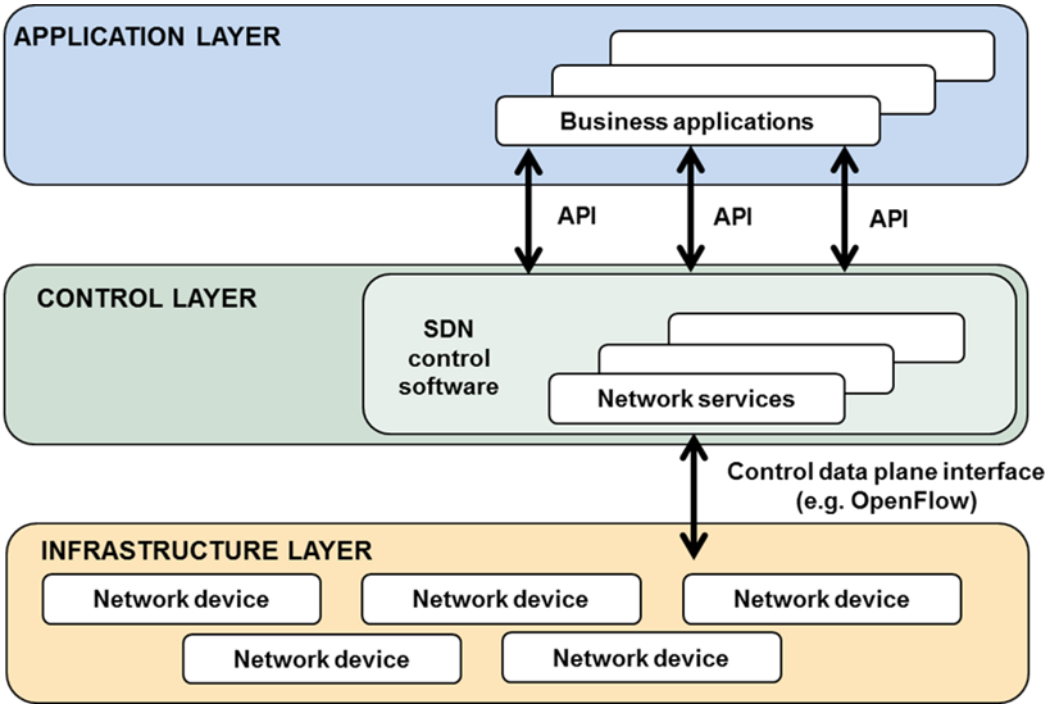
In reality, the full implementation of this this outcome is still some years off, though SDN is now on the wishlist for new infrastructure investment by telcos. What is required for widespread SDN deployment are standards that allows telcos to "mix and match" products of different vendors, rather than having to purchase vertically stacked elements from a single vendor.

Progress towards this standardised approach to SDN includes recent announcements by the Open Networking Foundation (ONF). ONF was founded in March 2011 with six founding parties: Deutsche Telekom, Facebook, Google, Microsoft, Verizon, and Yahoo. Its aim is to promote software-defined networking. The OpenFlow standard is the first step towards this goal, and is the result of collaboration between Stanford University and UC Berkeley. Cisco has recently announced its SDN as part of its emerging network infrastructure roadmap.

OpenFlow standardises direct access to the "forwarding" plane of network devices by "control" devices. Forwarding devices are the switches and routers (whether physical and virtual) that direct data across the network, while control devices manage traffic across the

network. The significance of this is that telcos will be able to easily integrate new forwarding and control devices (physical or virtual) into existing networks without being locked into a single vendor, increasing competition in the vendor supply chain and holding down costs.

Figure 4.2: ONF's three-tier SDN architecture with OpenFlow



Source: Open Networking Foundation

OpenFlow seems to be gaining some early ground: recently AT&T and NTT announced testing and trials using OpenFlow. Infrastructure such as Ethernet switches which are compliant with OpenFlow are already on the market.

The list of founding parties is remarkable, as are the collaboration efforts between two of the largest global carriers and two renowned universities that usually compete head-to-head. It is plausible that this new standard and the related developments could lead to a very disruptive technology advancement that will provide some significant network infrastructure cost savings, but will also provide some capability for telcos to truly differentiate their services from other cloud providers by enabling providers to more closely integrate the network into cloud services. In the mid-term, this could lead to the development of new features of cloud computing (and network-as-a-service) which will drive more enterprises towards telcos as preferred cloud providers.

In this regard, OpenFlow is similar to the past development and integration of SS7 signalling technology into the traditional voice network. When SS7 was being planned and the standards were being developed, it was the incumbent carriers at the time that drove development and imposed the standard on telco equipment vendors. In the US, the regional bell operating companies (RBOCs) and the jointly owned Bellcore R&D unit were driving the effort, which took years to accomplish. The development of SS7 by the RBOCs resulted in a disruptive network technology which, when implemented in their networks, resulted in major cost savings.

With SS7, the process of planning, standards development, initial testing, and implementation took over 10 years. It was predominately driven by the seven RBOCs, which were motivated by the potential for network savings on voice switch equipment, signalling resources, and trunks for providing local and long distance voice services. During SS7's long development cycle, the traditional vendors (AT&T Network Systems and Northern Telecom) were forced to open up their voice switches and provide SS7 interconnection.

It was some years before the operators started to realize that this new disruptive technology could also provide service capabilities. Many of the new services, including caller ID and call waiting, were so radical that it took marketing groups years to develop and introduce them. The OpenFlow development cycle will be faster, in part because the technology will be used to enable both intelligent network features and cloud services.

Further evidence of accelerated acceptance and development of OpenFlow is provided by the number of start-ups, including Nicira and Big Switch, which are betting on the early development and deployment of the OpenFlow standard. This is noticeably different to SS7, as there were few vendors outside the RBOCs and Bellcore until much later in the development cycle.

4.3.3. Devices and the managed device platform

Since 2009 Apple's iPhone and Google's Android smartphone software have fundamentally changed end-user and industry expectations of consumer mobile devices and services. The scale of these activities has grown enormously in the intervening years, as has the impact on other ecosystem players. The leading device software platform owners and other consumer technology vendors are steadily building out ever more comprehensive and integrated service and platform offerings. These offerings include both the applications that consumers use, and the cloud and device platforms that developers need to generate those applications. The aim of these efforts is to attract a critical mass of developer and consumer commitment to these platforms.

Managing the creation of these ecosystems is challenging, because each of the elements – developer platforms, devices and their associated operating systems, a critical mass of developers, and a critical mass of consumers – must be present to make the ecosystem work. This requires very large investments over several years, and if any element of the ecosystems is missing, this investment is wasted.

In order to achieve this, these players have not confined themselves to devices, but have integrated themselves into the provision of IT infrastructure in order to support the necessary application developer platforms. The ownership of software platform assets on devices (including device operating systems) and in the cloud (including application support platforms and app stores) is the defining characteristic of the most successful consumer technology players.

In mobile devices and operating systems, Apple and Google currently lead with iOS and Android respectively. Their strategies differ; Apple offers a vertically integration of the device and the associated operating system, while Google licenses Android to multiple device makers. While Apple captures the hardware revenue, Google licenses the OS to independents such as Samsung and HTC, allowing them to capture a significant share of revenue and encouraging them to pursue handset development. Amazon's strategy with the Kindle is similar to Apple's.

In fixed devices and operating systems, Microsoft and Sony have launched similar strategies in the game vertical with the Xbox and the PlayStation, and are expanding their reach into video entertainment and other forms of application in the "connected home" market. With its recently announced Xbox One device, which also delivers IPTV and the web, Microsoft

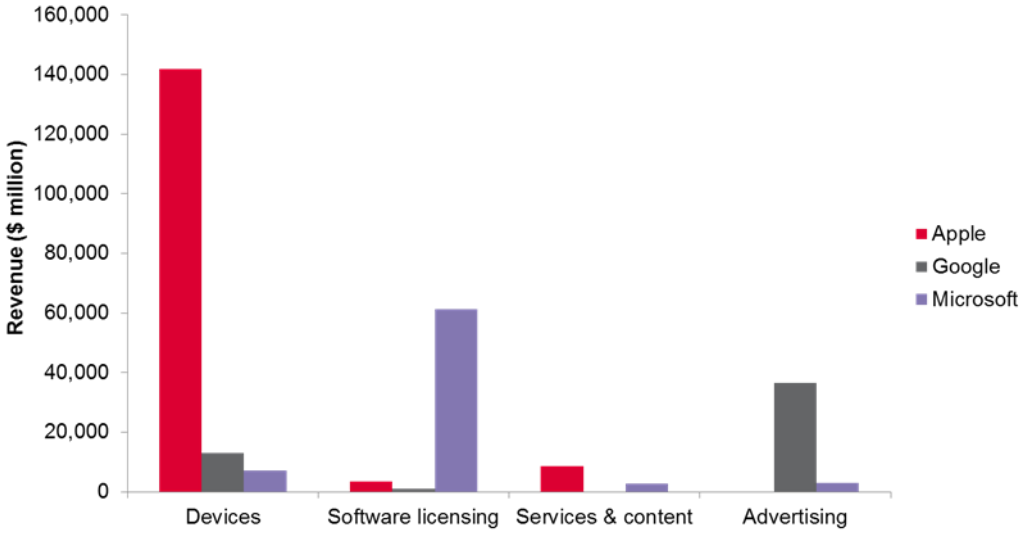
continues to move games away from recorded media into a cloud-delivered model that will buttress the developer ecosystem by enhancing gamer collaboration and the use of artificial intelligence in games. It will also be possible for players to remotely gain control of a friend's games, perhaps to assist with difficult tasks. The cloud compute power available will add to Xbox performance, bringing extra speed to games, and cloud storage will support persistent virtual worlds. The Sony PlayStation 4 will offer similar functionality. Samsung has also expanded into video entertainment with Internet-enabled televisions.

In contrast, device makers who have failed to make this transition, such as Nokia, Atari or Motorola, have little market power and face pressure on margins. Such vendors play at the margins of the supply chain. Other players like Facebook have large customer bases, but relatively small applications support and developer communities, and no devices or device operating systems. They will need to mobilise very large investments, or seek partnerships with other platform and device providers (e.g. Microsoft and HTC), to catch up with the established MDPs.

There is a strong incentive for MDPs to move into a large range of services; app stores are an important way that this is achieved. This form of horizontal integration allows these players to fully exploit their sunk investments in device and platform development. The various offerings now cover a plethora of core applications and enablers across multiple screens. These are tied together by interdependency between the device operating system and the associated application platform and app stores, and are driven by powerful self-reinforcing network effects between users, applications, and third parties. The leading offerings now attract hundreds of millions of users and hundreds of thousands of third-party developers and present a direct challenge both to the aspirations and core businesses of traditional communications service providers. As a result, these device platform providers are very strong brands and have strong and strengthening relationships with consumers.

The similarity in approach adopted by different MDP players, allied to their differing business models – among them hardware sales, advertising and software licensing – is creating an extremely cut-throat competitive environment in which individual providers are willing to run vital parts of the total offering as loss leaders if that increases their opportunities elsewhere. Direct revenue to the provider arising from content or application sales has rarely been the ultimate goal, although it may be significant in driving revenue and loyalty among third-party developers. The very different origins of these players results in highly variable revenue models, as illustrated in Figure 4.3.

Figure 4.3: Consumer tech player services revenue sources (2012)



Source: Ovum

The enormous investment necessary to achieve sufficient scale for this strategy to become self-sustaining means that only a small group of companies are positioned even to try. The ecosystem effects noted above create significant barriers to new entry, as the relevant APIs are open to application developers but not alternative MDPs. The end result has been to shut off opportunities for many competitors in the broader ecosystem, threatening traditional relationships with end users. Telcos and smaller consumer technology providers are being seriously affected by these developments and must now think strategically how best to respond to the challenge.

4.3.4. The vendor landscape

Telecom-centric equipment vendors have seen margins decreasing significantly in recent years, leading to consolidation and extensive layoffs. Weak capex amongst service providers has worsened the outlook, as has the continued growth of Huawei. While there will be capex spurts in certain markets such as LTE over the next few years, Chinese telco equipment vendors are positioned well in many of these, raising barriers for their competitors. The consolidation already seen is therefore a response to weakness, rather than a grab for strength.

In the longer term, vendors must position themselves to thrive as the IT and telecom worlds converge. The IT and communications worlds are coming together as service provider networks evolve to be more software-centric and as network intelligence migrates to the data centre. Yet this is happening slowly, like all change in carrier networks. This blending will impact network design, product choice, sales models, purchasing decisions, and ultimately the competitive landscape, and will require telco vendors to acquire new skills in software development for cloud infrastructure.

For now, there remains a camp of distinctly telecom-centric vendors, led by the big five – Ericsson, Huawei, NSN, Alcatel-Lucent, and ZTE – plus Cisco, which has a unique balance of telecom and IT, followed by dozens of smaller players. For many of these companies, times have been tough since the financial crisis hit in 2008.

It is getting harder to define a "telecom vendor." Only a few specialist vendors sell exclusively to service providers. Most have a wider range of products and services and sell at least some of them to enterprises and consumers. Software-defined networks (SDNs) and software-enabled features, from the mobile RAN to the optical core, are rising in importance. From the telecom side, Huawei is making an effort to develop capabilities in IT, introducing servers and other data centre products and ramping up sales teams to target enterprise verticals. Cisco is also positioned well, with a large cash stockpile and high margins. It exemplifies a vendor that "gets" the convergence of telecom and IT and has the revenues in both markets to prove it.

At the same time, there are fewer purely telco or IT buyers. Some telcos now spend up to 10–15% of their capex on data centre infrastructure, and anecdotally this seems to be growing. Now that software and virtualization are becoming crucial to telcos' network planning, and with telcos' needing more sophisticated support on the services side, IT vendors are likely to creep into the telecom vendor space. In fact, although not related to virtualization, Oracle's announcement in February 2013 of its intent to acquire Acme Packet (which develops voice, data and unified communications services and applications for use across IP networks) is a concrete example of an IT-centric company's significant move into telecom networking.

On the other hand, cloud service providers such as Google, Facebook, Amazon, and others are buying or developing more carrier-class technology over time. Telecom vendors big and small must determine how to serve these adjacent market customers while also helping telcos to evolve their networks to software-centric architectures.

Beyond Cisco and Huawei, most other big telecom vendors are under pressure. Shrinking into a niche is one option; NSN is doing this with mobile broadband, and ZTE may be following a similar path but with a more regional focus. Further telco/IT vendor integration by merger and acquisition is highly likely.

4.4 Competition and innovation

4.4.1. Competition

One of the most fundamental changes to the consumer resulting from the change in infrastructure supply chains is the level and diversity of competition and innovation that is created by the separation of the network layer and the services layer. Consumers can mix and match services from multiple providers independently of the network access. This separation has made it harder for infrastructure providers to differentiate, and had led to an overall decline in their market power. This has two main competitive implications: consolidation in the infrastructure space, and new competitive pressure from managed device platform providers.

Network and IT infrastructure continue to grow in importance for the delivery of different communications and media services. However, these operators (particularly telecommunications infrastructure operators) are in danger of losing their dominant positions as the technological and commercial forces described above, along with pro-competitive regulation, make it easier and cheaper for other companies to exploit their network assets.

At the same time, the high costs of high speed broadband access networks, combined with a decline in infrastructure margins, are driving increased network-sharing and targeted subsidies, and thereby introducing new stakeholders into the domain of networks and infrastructure. In some markets, infrastructure spend is being shared by telco operators, and network operations are being outsourced to telco vendors. In others, governments are directly funding infrastructure. In addition, as telecommunication operators, vendors and

other companies evolve their businesses, so too does their expertise evolve. In some cases, it no longer makes sense for telecommunications operators to be involved in, for example, passive infrastructure or in basic network management, leading to passive infrastructure activities being spun off to private equity or infrastructure investors.

These forces will accelerate the evolution of telecommunication operator business models and the dissolution of vertical integration as their modus operandi. In the medium term of eight years, we believe that in many markets telecommunication operators will still own and operate networks, but in most cases, their approach to networks will have significantly changed – for example, more network-sharing across mobile and fixed networks, and more outsourcing of network management to vendors.

More significantly, many telecommunication operators will have chosen or been forced by regulators to comprehensively open up their networks to third parties, increasing their reliance on wholesale revenues and reducing their control over the services provided over their networks. In Australia, this was set in motion some time ago with the opening up of telecommunications networks and services to competition. We have outlined how the rise of IP has accelerated and expanded this process.

Ovum sees a similar future in store for IT infrastructure providers. The trend towards the standardisation of cloud services will accelerate commoditisation of IT infrastructure activities, placing further downward pressure on margins as buyers of cloud services are more easily able to substitute one provider for another. In both cases, the trend to consolidation is a consequence of weakness, not strength.

The new competitive threat to infrastructure providers is the growth in market power of the managed device platforms. These device platforms threaten the traditional relationships between telecommunications infrastructure providers and broadcasters, and their subscribers and audiences. They have strong brands, and will push the telcos and broadcasters into a secondary status in some, perhaps many, service markets.

Traditional telecommunications network regulation has focussed either on consumer performance of traditional services (such as the large body of voice service regulation) or has focussed on wholesale network to network interconnection to reduce barriers to entry. As more players without networks build a larger market share of the services being provided to consumers, the focus will need to shift away from sector specific regulation towards general competition law and abuses of dominance. The global character of many managed device platforms will complicate attempts to maintain purely national policy approaches.

Telcos and broadcasters can respond by launching their own services, but their connection with the device makers is relatively weak, as are their brands. The separation of applications and infrastructure means that their infrastructure position no longer confers a significant advantage in the consumer applications market. The telcos and broadcasters will therefore focus on areas where their ownership of telco infrastructure is an advantage, such as cloud services.

There is a risk that telcos and other network owners may attempt to recover some advantage by treating traffic generated by their own services differently to traffic generated competing providers; this is the substance of the "net neutrality" issue. Network operators need the ability to manage traffic flows and enforce traffic management policies to provide QoS guarantees to both consumers and wholesale network users; much of the telco and consumer advantages of SDNs will arise from these and similar practices. However, the use of such techniques to discriminate against competitors is problematic, and there is a need to ensure this is done in a transparent manner to ensure that network neutrality requirements are met.

4.4.2. Innovation

The main consequence of vertical separation is that the control of application innovation is generally shifting to the applications supply chain, and specifically to the large social media networks and the managed device platforms. This has many advantages for consumers. The rate of innovation has increased dramatically as applications can be quickly launched without reference to the underlying infrastructure owners.

In contrast, technological innovation in the infrastructure industry is rendered invisible to consumers because of the network abstraction at the IP layer. Consumers only see quantitative improvements in performance measures such as speed, latency and of course price. As we have noted, this effectively commoditises managed data offers. Differentiation will require a continuous innovation approach because SDN approaches will ultimately be ubiquitous and popular innovations will be copied by competitors. Innovative approaches to traffic management and pricing will therefore need to be constantly updated to meet new needs in order to maintain a competitive edge.

4.5 Consumer implications

4.5.1. Consumer revenue models

The separation of the network access service from the services layer is both a source of competition for consumers as well as a source of added complexity. Under the traditional supply approach, consumers purchased a service from a provider that included integration with the network. Under the emerging infrastructure supply chain, consumers have separate relationships (whether linked to retail revenue or not) with the network access provider and the communications and media service suppliers. Hence consumers must manage a greater number of supplier relationships, each with different terms, conditions and policies towards issues such as privacy.

We expect to see a trend towards the simplification of infrastructure revenue models. As the sources of differentiation shift to the applications supply chain, points of differentiation between different infrastructure offers are reduced. With data seen increasingly as a utility product, pricing models will simplify, with pricing differences in the market due only to quantitative factors such as speed, coverage and latency.

Telcos are trying to recover some differentiation by bundling data products with voice and video – the so-called triple play strategy – and other applications. The commoditisation of data is evident in the fact that data speeds (and data allowances in the Australian market) are only one determinant of price, and variations in video packages are a bigger driver of price scales. Telcos are typically reluctant to report churn measures, but operators as diverse as PCCW in Hong Kong and AT&T in the United States report that this strategy works to discourage churn - at least for now. With the introduction of bundling in 2010, Telstra's churn rate for fixed broadband services fell from 22.8% in FY10 to 17.3% in FY11 (ending June 2011).

4.5.2. Privacy, security and consumer recourse

Traditional infrastructure supply chains were mostly a closed environment, with the consumer information contained within the network delivering the service and under control of a single domestically domiciled entity allowing for relatively easy oversight and regulation. For emerging infrastructure supply chains, the service delivery and consumer information is split between multiple entities, some of whom may be located in overseas jurisdictions. Even

where communication and media service providers have appropriate policies around consumer privacy issues, the consumer information is being collected and stored in many more locations than with the traditional infrastructure supply chain. The diversity of service providers, ranging from large established companies to small startups, will have different levels of security to protect the consumer information that they have access to. This more diverse and complex system, along with the more inherently open nature of the emerging infrastructure supply chains makes protecting consumer information more complex and difficult than under the traditional supply chain.

The free to consumer advertising supported model has existed since the early days of commercial media services. However, the level of information the media service provider knew about their audience was limited to aggregate estimates based on small audience sampling.

The emerging infrastructure supply chain allows communication and media service suppliers to gather a very detailed set of information about individual consumers and either sell this information or use it to provide advertising targeted to individuals. The information is not traditional demographic information, it is cumulative information about the individual's use of various applications such as video entertainment, web browsing and email. With the network access costs covered independently by retail tariffs, it is possible for a wide range of communication and media applications to be provided on a "free" or advertising supported basis, based on the trade of this information.

Any service that is provided on an advertising-supported free to the consumer basis is operating a two-sided market. These service providers want to maximise the size and quality of their user base (downstream consumers) in order to attract advertisers (upstream customers). The key is balancing the demands of the upstream customers for more detailed user information for better advertising targeting with the privacy concerns of the downstream consumers. As discussed in the previous section, this is proving a challenge to consumers, service providers and regulators.

Network security is also becoming more complex. The traditional network, with its strong infrastructure/service integration, was inflexible but also relatively secure because deliberate service outage or service interception required access to the infrastructure. As networks and other kinds of infrastructure become more programmable, this is no longer the case. The emergence of APIs in both the network and IT infrastructure supply chains, which are accessible across the self-same network, is increasing the number of potential points of hostile entry. The benefits of a more open network design philosophy must be weighed up against the attendant risks in a wider risk management framework.

4.5.3. Service availability and consumer recourse

Universal access by consumers to baseline levels of certain services dates back to the postal systems and was carried over to the voice telephony networks that often originated within the postal departments. When a service, such as postal letters or voice telephony, is provided by a single monopoly provider, it is relatively easy to cross-subsidise from economic areas to uneconomic areas to extend services in an affordable manner to all (or a majority) of consumers.

The emerging infrastructure supply chain complicates this arrangement. Traditional integrated service providers effectively cross-subsidised their infrastructure investment out of their application revenues, particularly high margin PSTN voice revenues. With the disintegration of this structural model, this is no longer possible, and infrastructure must cover its own capital costs out of lower margins. At the same time, a new and more demanding requirement for access to broadband IP connectivity has emerged.

This has led to a recent global policy consensus that action to promote access to broadband is important to social and economic development. This commitment has taken different forms in different circumstances. In emerging markets, most efforts have focussed on spreading access to mobile broadband. In developed markets, governments have adopted a range of methods to mobilise both public and private investment in fixed networks.

Consideration should still be accorded to affordability of access by all consumer demographics as distinct from availability of access. This will become more critical as many government services, such as health care, continue to transition to more online-intensive delivery models.

Consumer recourse and protection issues will divide between infrastructure and applications-related concerns, much as the industry has. Increasingly, the diversity of applications (including voice) will require them to be subject to general consumer law, while provision of the underlying managed data services can be subject to a more specific regime.

A focus of consumer protection on infrastructure has the advantage that the final access provider is always a domestic player, and therefore under domestic jurisdiction. However, this cannot be said for all elements of the supply chain, particularly IT infrastructure providers. Where international IT service providers play a role in either infrastructure or applications service provision, enforcement of either industry-specific or general consumer law is problematic. This has not prevented the growth of these services.

This shift is consistent with our view that customers are taking on a more consciously "consumer" identity. As remarked earlier, not all consumers are as ready for this transition as others – older people being one example. There is a risk that consumer expectations will vary significantly during a long transition phase, generating tension between industry and certain classes of consumer as responsibility for service outcomes is blurred between infrastructure and application providers. This may also generate commercial opportunities for local application providers that are prepared to guarantee end-to-end performance of these services.

5 Supply chain trends: an industry-level assessment

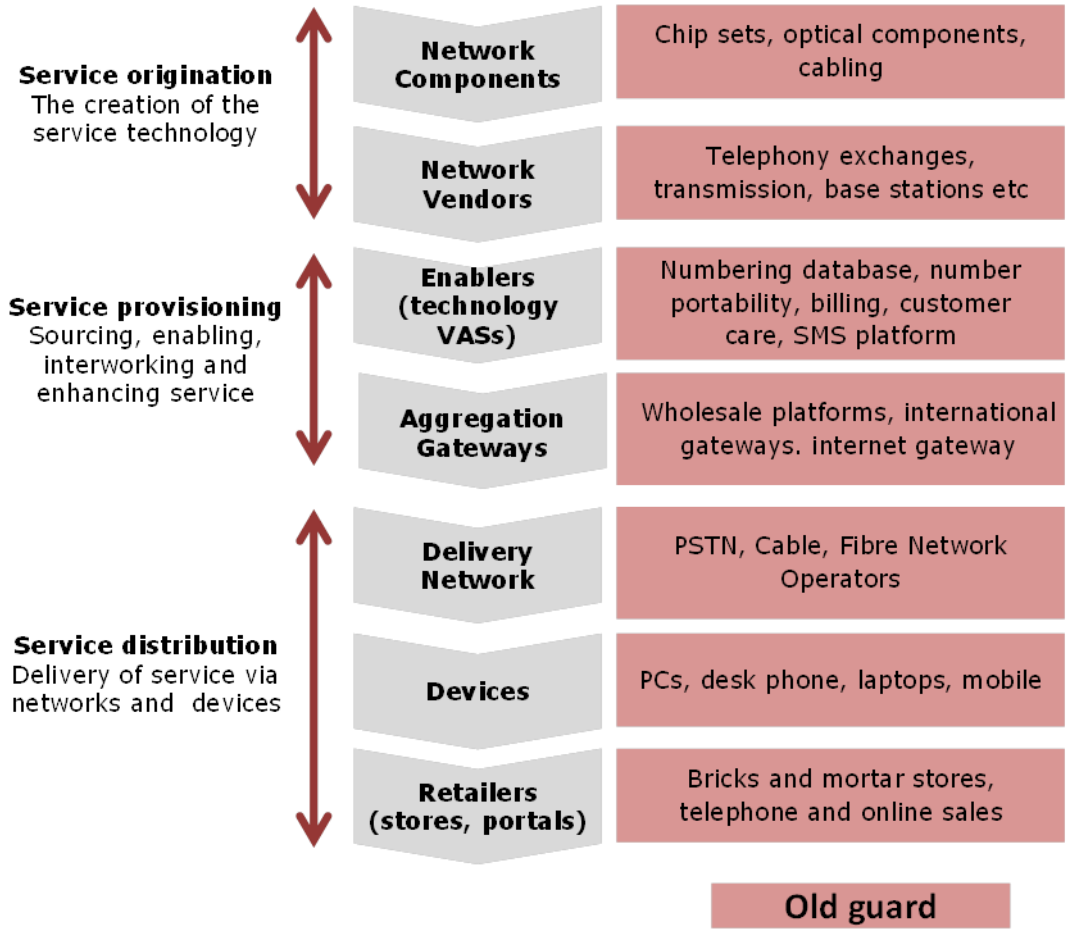
In this chapter we offer an assessment of the way that the top level supply chain trends are playing out in the production and delivery of five services: messaging, voice, music, games and video entertainment. Each of these has unique features, and a pattern of consumer impacts which varies.

5.1 Voice and Messaging Services

5.1.1. The traditional supply chain

The traditional supply chain for voice and messaging services has revolved around the standard equipment vendor – telecommunications operator model as shown in Figure 5.1.

Figure 5.1: Voice supply chain - Traditional



Source: Ovum

In the traditional supply chain model the key components were:

- Network Vendors & Component Suppliers – traditional network vendors such as Ericsson, Alcatel, and Nortel competed for telco network build and transformation to ISDN, xDSL and FTTx networks. Advances in lower cost manufacturing and technologies combined with production shifts to lower cost regions such has China saw a major reduction in the number of global network vendors and the introduction of powerful new vendors such as Huawei.

- Service Enablers – these were a mix of IT vendors such as Amdocs who built service platforms for billing/customer care and network vendors who built value added service platforms such as SMS and numbering database.

- Delivery Network and Aggregation Gateway suppliers – traditional suppliers in Australia included Telstra (incumbent telco) and Optus with fixed and mobile networks all with interconnection capability for any to any connectivity. Within this component there has been several technology shifts over time for both fixed and mobile networks. On the fixed side we have also seen the introduction of new access providers for broadband services (e.g. iiNet) who built broadband access networks through wholesale regulated services such as Unbundled Local Loop.

- Devices – these suppliers provided standard fixed telephones and mobile handsets. Advances were made in the type of handset, features and technologies. While the equipment was often manufactured by the handset arm of the Network Vendors, the devices themselves were supplied to the end customer via the Retailers.

- Retailers – traditional fixed suppliers have included the retail arms of vertically integrated operators such as Telstra along with players such as AAPT and Macquarie Telecom. On the mobile side, access providers such as Telstra and Vodafone have remained vertically integrated with only a small wholesale offering available for Retail Service Providers. While many of the new fixed providers installed switching infrastructure (which interconnected their networks with the access provider), there were also resellers in this category who simply resold the fixed or Mobile Retail Service providers product. The retail service provider owned the relationship with the end customer and typically setup up long term contracts for supply of voice and messaging services.

While voice services were the dominant revenue source across fixed and mobile networks, traditional messaging was only successfully established on mobile networks via the SMS service. While there were fixed SMS services, these did not take off in any significant degree. However, mobile SMS volumes grew dramatically and the service operated on top of the existing mobile network - which meant that the incremental service cost was very low and the service profit was high.

The key enablers for the traditional voice and messaging model included:

- Any to any connectivity between network operators and retail service providers supported with regulation;

- National numbering plan and number portability to enable calls and messages to be easily made from one service provider to another;

- Quality of service standards for interconnection, call performance (typically on fixed networks);

- Access to emergency services – especially for fixed networks; and

- Use of network standards to allow operators to support multiple equipment vendors and end user devices.

Although there has been competition within the various supply chain components and the access component was subject to wholesale regulation, the traditional supply chain model remained stable for many years. In this model the end user devices were relatively simple (unlike smart devices today) and services were integrated into the infrastructure which was expensive to replicate. As such the retail service provider was able to tightly manage and own the end user relationship.

From a monetisation perspective, equipment vendors collected revenue from the access providers for network equipment and the access providers/retail service providers for devices. In turn the retail service providers collected revenue from the end customer for access, calling and value added services such as messaging. Competition was therefore focused on market share (ownership) of end customer revenues across consumer and business markets.

5.1.2. The emerging supply chain

As broadband services gained market share and applications interacted directly with end user devices, a fundamental shift in the customer ownership occurred. Applications enabled a direct relationship between the application provider and the end customer which was outside the control of the retail service provider.

The application providers were not infrastructure players with large capital investment models, their core competence was software development and the platforms they operated required only a small amount of infrastructure (server, internet connectivity) which could serve multiple countries from one geographic location thanks to the global internet.

In addition, application providers were able to monetise their products indirectly through advertising rather than directly with the end customer. Mobile operators initially offered walled garden environments where end users were only able to utilise selected applications.

However there were delays in monetising these products on any reasonable scale due to three main blockers:

1. Broadband services were not ubiquitous hence any to any connectivity was limited and or not ensured;
2. Early broadband services ran at relatively lower speeds and network quality was not ensured; and
3. Users were tied to the computer in the case of fixed services and wireless handsets had limited functionality;

From a fixed perspective application demand for voice applications such as Skype continued to grow especially to avoid for high cost voice services such as international calling. Fixed messaging applications were also growing with applications such as Microsoft Messenger. Games also added messaging capabilities where users could send messages to other players and voice services where online players could speak to each other (e.g. Call of Duty).

However, these applications did not deliver the same any to any connectivity, quality of service and ease of use outcomes as traditional products, and these factors were still very important factors for consumers.

As broadband networks improved the first two blockers declined, but monetising applications was still not straightforward. In order to grow the base of online users, voice and messaging applications generally offered free on-net calling and messaging. Although Skype released Skype Out and Skype In services to allow revenue growth, there was still a strong expectation of free Skype to Skype calls and messages by consumers. Some alternative VoIP providers such as Viber, and messaging providers like WhatsApp have accepted this fact. The

addition of non-peer to peer services such as Skype Out also required additions to the platform – to enable connectivity with traditional wholesale operators for the termination of calls and messages.

The decisive enabler for mobile and fixed IP based voice and messaging services was the introduction of application based smartphones and tablets which, whether through fixed Wi-Fi or mobile access, had removed the third blocker of being tied to a fixed computer and limited handset functionality. From a supply chain point of view these devices also opened up the terminal segment of the traditional supply chain since the manufacturers of these devices were not limited to traditional equipment vendors looking to supplement their network equipment revenues but consumer device manufacturers looking to supplement their existing product value chains, for example:

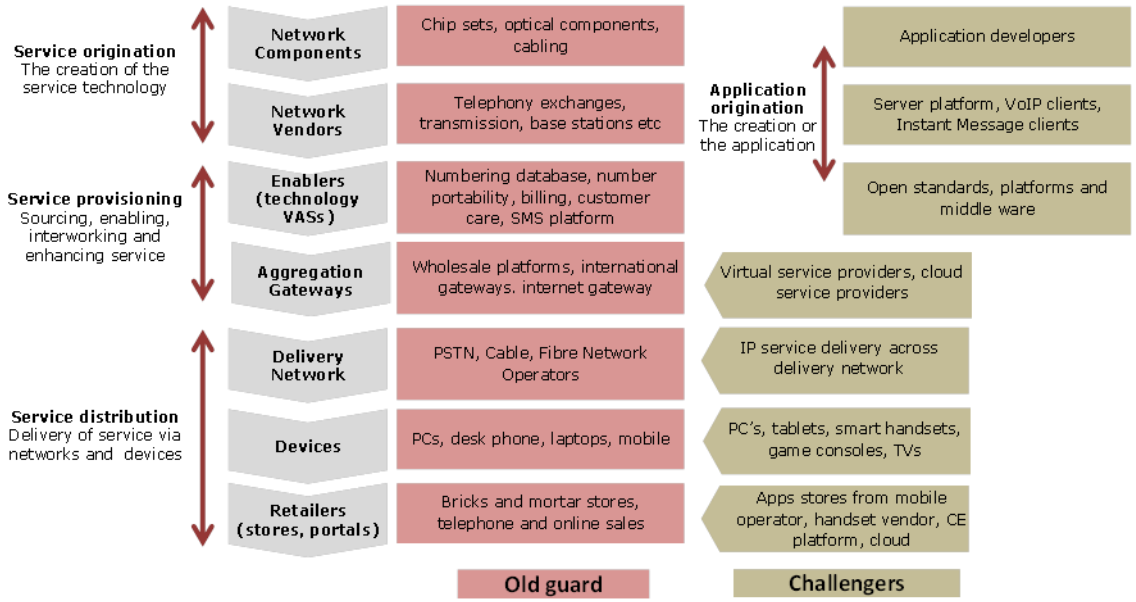
- Samsung's television supply chain had added internet connectivity and video and music content. Application driven smartphones would allow cross functionality and also ownership of the end customers for content and other applications. The immediate revenue driver for Samsung was to stay competitive in the digital television market but the longer term strategy of deriving new revenues from new services further supported the investments in content;
- Apple's iPhone connected end customers directly to Apple's application store or music and video content supply chains. This enabled the content to be reached from more locations.

In addition to stand alone VoIP services such as Skype, players from outside the traditional VoIP market (e.g. Facebook) have started to add VoIP services to their portfolios (which already include instant messaging/chat functionality) in an effort to strengthen their position as the landing place of choice on the Internet. Social networking address models (password-protected web sign-in) are independent of any specific access network or device, and allow users to choose the best available communications path (e.g. smartphone, laptop with webcam, Internet cafe) without the need for a predefined identity or commercial relationship.

As most social networking voice and messaging services are offered through closed communities, their major weakness can be interoperability. However this is becoming less of an issue as these communities grow. There can be little doubt that person-to-person voice communications within social networking applications will become more prevalent, and while this will have a significant negative impact on traditional voice telephony revenues it will enable greater innovation of communication services embedded within a variety of applications. Applications with embedded VoIP may lead to new kinds of person-to-person, one-to-many and person to machine interactions (such as with the Siri voice-enabled "assistant" on the iPhone).

The emerging supply chain (see Figure 5.2) now runs in parallel with the traditional supply model which enabled over the top applications running embedded VoIP and messaging software. In addition the devices component now takes a much more active role in the supply chain since it enables direct communication with applications outside the network.

Figure 5.2: Voice supply chain in transition – traditional and emerging



Source: Ovum

While over the top VoIP is not about to replace traditional telephony, Ovum's modelling[1] shows that OTT VoIP will have cost the global telecoms industry $479bn in lost revenues, which will represent 6.9% of total voice revenues.

The long-term trend for OTT VoIP is towards a richer and more complex communications environment in which voice serves a different function and traditional telephony plays a smaller role.

Traditional messaging services such as SMS face a large risk of substitution from IP based messaging. Ovum estimates[2] that the cannibalization of SMS revenues by OTT players, will reach $54.37bn by 2016. Not only are OTT players changing consumers' messaging preferences, but the pressure they are exerting on operators' messaging services is forcing operators to offer increased SMS bundles and experiment with messaging pricing models, further dampening revenue growth. In addition to the consumers messaging preferences changing end user device manufacturers are also integrating messaging applications into devices. An example here is iMessage from Apple:

- iMessage is a service rooted in Apple devices, and formed from a device perspective. Its focus is on usability, interface, and the intuitive nature of the service.
- It is integrated with the handset contact list and is compatible with FaceTime, which enables VoIP and video conferencing. iMessage is also integrated with SMS, allowing users to switch between the IP and SMS channels according to convenience and device used.
- There is no monetization model in place, because the primary purpose is to drive revenues through device sales. With a reach of 100+ million subscribers, iMessage is potentially a massive threat for operator messaging services.

[1] The Future of Voice, Ovum, 24 July 2012
[2] Counteracting the Social Messaging Threat, Ovum, 17 July 2012

5.1.3. Competition and innovation

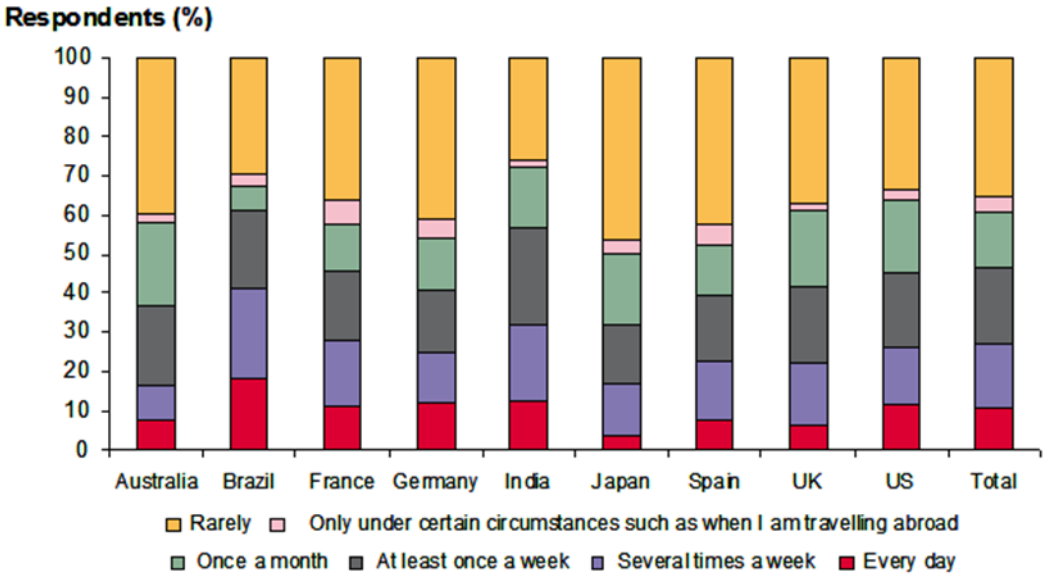
VoIP now has a significant presence in mass-market consumer and enterprise service portfolios, and telcos must continue to develop VoIP services as part of their wider broadband strategies. However, new VoIP innovations, such as embedded voice in social networking, provide few revenue opportunities for telcos. Telcos' monetization opportunity will lie in areas such as:

- Integrating voice subscriptions and minutes into service bundles and bundling across services;
- Using service quality to differentiate from soft-client VoIP and messaging services. However fixed broadband quality is already generally high and it would only be in conditions of network congestion where an operator could seek to charge more for a premium VoIP call. Similarly, while mobile high definition voice will be attractive to users, we believe it will be difficult to monetize given the general acceptance of mobile users to lower quality voice (although this has also improved over time);Partnering with established OTT players. As part of this strategy, telcos can provide access to OTT VoIP services as part of their offering to customers, and provide supporting functionality to OTT players, including caching, peering, and interconnection between OTT VoIP and telephony services. Examples of this approach include the arrangements between Skype and "challenger" mobile operators such as KDDI in Japan and Telkomsel in Indonesia. Sprint has a similar partnership with Google Voice in the US.
- Adopt the Rich Communication Suite (RCS) platform. RCS is the GSMA standard for rich communication, and adopting it will allow operators to offer consumers features such as file sharing, video calls, and IP-based messaging. It brings together operators, handset manufacturers, and vendors to better offer IP-based services on the mobile network. However, adopting the RCS platform has been in the pipeline for several years now, and Ovum does not expect this service to reach the mass market anytime soon.

As reported in Ovum's global fixed voice and broadband outlook[3], Ovum's Consumer Survey Panel found that 49% of respondents from around the world make VoIP calls. Figure 5.3 highlights the impact that VoIP services are having on voice traffic and call revenues. Globally, 46% of respondents that made voice calls using a VoIP service did so at least once a week or more often. Of the Australian respondents, 37% reported using VoIP at least once a week. However, as the survey was focused on broadband users, it must be noted that the sample is weighted heavily towards early adopters in these countries.

[3] Global Fixed Voice and Broadband Market Outlook: 2011–16, Ovum, April 2012

Figure 5.3: Frequency of VoIP use by Ovum Consumer Survey Panel members



Source: Ovum, April 2012

In Australia there are many operators offering VoIP services across a range of customer segments. While the majority of these players are small their entry into the market shows the ease (minimal infrastructure and readily available software packages) at which VoIP services can be offered. The model for an ISP is to add functionality while also increasing profitability by offering VoIP rather than purchasing voice at wholesale from Telstra. According to VoIP Choice, an Australian VoIP guide website, there are more than 30 providers of VoIP services in Australia.

Operators such as iiNet and Engin offer VoIP services to both consumer and small business customers. iiNet also offers Netphone2 VoIP services on its NBN consumer package.

For enterprise customers, Telstra's IP telephony (TIPT) integrates IP telephony solutions with Microsoft Office Communications Server so enterprises are able to place voice calls directly from Microsoft applications including Office Communicator, Outlook, and SharePoint. Over 300 organizations currently use TIPT and we expect Telstra will shift its focus to SMEs at a later stage with a full hosted and managed approach for unified communication offerings.

Primus Telecom, for example, has launched Acella Cloud VC in 2011, a hosted video conferencing solution that includes features such as polling, Q&A, and the ability to share documents, files and software applications.

Since the emergence of Skype in 2003, new start-ups offering OTT VoIP services have become a major threat to telcos' voice revenues. The advent of smartphones has expanded this threat to the mobile market, and has led to a proliferation of VoIP and messaging apps. While Skype continues to be the largest and most successful OTT VoIP provider, other services such as Viber, Vopium, and Rebtel are increasing their market share.

Given the high price of international voice calls, the use of VoIP services is disproportionately skewed towards the international voice market. However, the impact on telcos' domestic voice revenues is increasing.

The most threatening new entrants for telcos are not those entering the already-overcrowded VoIP telephony service market, but providers that have offerings that embed voice services into other applications such as online gaming and social networking.

In terms of conventional telephony, gaming based voice services (such as Voice Chat in the game Call of Duty) are more like conference services. However, they are not the same as conventional teleconferences as they are self-provisioned, administered, and managed. There is no call setup, and unlike VoIP services such as Skype, the user interface is not based on a telephone call. These services provide no mechanism for interconnect with other parallel systems or the PSTN, and there is no mechanism for legal interception as the architecture for the service does not involve a central server. The communications channel is typically encrypted, and because the services tend to be free, no user data is collected. Although VoIP sessions already use limited bandwidth, these services are designed to use as little bandwidth as possible so as to minimize the possibility of interference with the performance of the game itself. There are many gaming VoIP application available including:

- Mumble: VoIP application primarily designed for use by gamers and uses a client–server architecture which allows users to talk to each other via the same server. All communication is encrypted to ensure user privacy.
- Ventrilo: VoIP software that includes text chat. Both the Ventrilo client and server are available as freeware for use with up to 8 people on the same server.

Social networking and other Internet application providers are also adding person-to-person "call" functionality to their offerings to primarily increase stickiness of the underlying product (and to increase advertising revenue), rather than as an effort to capture traditional telephony revenues. However, telcos are increasingly the unintended victims of these initiatives as users communicate within an application rather than outside it. This strategy is also different to Skype's strategy of pursuing interconnect revenues through Skype Out and Skype In.

The VoIP offers with most disruptive potential are those offered by managed device platforms providers. Microsoft's recent purchase of Skype in 2011 is likely to result in the VoIP service being extended and integrated with other Microsoft applications and platforms, including Windows for PC, Windows Mobile, and the Xbox gaming console. This will further drive the adoption of OTT VoIP services. It is also possible that Google will use the Android platform to launch its own OTT VoIP offering, which would have major consequences for telcos and the VoIP market. Since any-to-any connectivity is restricted in peer to peer VoIP services (due to the lack of a numbering/address system across platforms), critical mass will play an important role in the ongoing success of these applications. For example, Skype recorded 280 million active subscribers at the end of 2012 and Facebook reported 1.1 billion monthly active users as of March 2013.

The continued existence of the traditional E.164 telephone number remains a key asset for operators as it is central to their relationships with their customers. The threat posed by OTT VoIP is that it weakens customers' attachment to their telephone number, and transfers their attachment to a new address.

Social messaging has experienced strong year-on-year growth since 2010. Each year, respondents to Ovum's Consumer Insights Survey are asked to pick their most used apps on mobile devices. In 2010, 23% of respondents opted for messaging; this grew to 32% in 2011 and 42% in the most recent 2012 survey – a growth of 19 percentage points since 2010. We believe this trend will only intensify in the years to come due to:

- the network effects of increasing numbers of end customers using the applications;
- the continued penetration of smart devices;
- the development of the apps themselves into content-rich and user-friendly services.

Ovum's Consumer Insights Survey (2012) found that the most popular social messaging service was Facebook Chat via mobile, with 28% of the respondents using the service. In

second place was Google Chat with 13% of respondents, and WhatsApp came a close third with 12%. The global social messaging landscape is peppered with small, regionally strong players such as QQ (China) and Line (Japan). However, these services have not gained global popularity, and do not have a significant user base at the total sample level across the 11 countries Ovum's Consumer Insights Survey (2012). The strong performance of Facebook and Google indicates that services with a social network backing seem to have a wider audience in social messaging as well.

5.1.4. Consumer implications

5.1.4.1. Consumer revenue models

Although embedded voice and messaging services will allow innovative applications to be developed, the revenue model to date is generally not focused on generating new calling revenues but rather for supporting revenues from other applications such as Facebook advertising and gameplay functionality.

The complete collapse of telephony revenues is not inevitable or even likely, and operators will continue to work to maintain their voice revenue streams. This will require them to adapt their pricing strategies by examining elasticities and cross-elasticities of demand to enable targeted price increases where possible. While there is no universal tool for enabling price increases, options can include:

- changes to pricing increments or measuring units
- the design of bundle breakpoints
- charging for out-of-bundle use or bundle top-ups
- differentiated pricing according to the number called
- the exclusion of certain numbers from in-bundle calls
- roaming charges to compensate for international OTT voice.

Although the above options exist, consumers can respond by increasing the use of OTT services. As a result, telcos also focus on providing large data and voice allocations in monthly plans where typical users become indifferent (from a pricing perspective) about making an OTT call or a traditional telephony call.

In time, as voice is increasingly seen as another broadband application we expect operators to focus on the value of the monthly data allowances rather than trying to price separately for voice. Most people, for most purposes, will get national calling bundled from their telco for the price of a monthly subscription. Operators are also likely to push the value of higher quality communication services, but as discussed earlier it is not likely to increase monetisation just hold market share.

Whilst the entry of OTT players has led to changes in consumers' messaging preferences, it has also forced operators to offer increased SMS bundles and experiment with messaging pricing models, which has further dampened revenue growth.

We note that as traditional PSTN services are migrated to the National Broadband Network (NBN), dedicated voice services will be delivered to end-users using a voice specific Traffic Class (TC-1). Indeed a TC-1 service is bundled with the standard NBN broadband access service, meaning that this service is available at no incremental cost to all premises that have an NBN broadband service connected. In our view this will continue to provide a "traditional" voice service even though the bearer technology will be IP. Additionally this

allows new retail service providers to offer services using NBNCo's wholesale services thus increasing choice for customers. However unlike the OTT players the retail service providers will need to obtain telephone numbers and purchase backhaul to NBNCo's point of interconnect.

5.1.4.2. Privacy, security and consumer recourse

As a complementary service, consumers may not expect the same quality standards from an OTT voice application as per the traditional PSTN (or in future NBN) service. The attraction of free messaging or voice services is a strong incentive to use the service, however the privacy and security of these services is not with a (generally trusted) telco operator but is now in the domain of the public internet and is therefore very dependent on the controls put in place by the application service provider. This may result in customer data being shared with other parties and transferred and/or hosted overseas where privacy laws may not apply. In addition the content of the communication itself (voice or messaging) may be more susceptible to eavesdropping if the service operates on an unsecure server platform or may indeed be accessed by the provider itself. Use of the eavesdropped data could range from supporting criminal activity to providing additional customer information for marketing purposes.

If the voice and messaging applications are hosted in another country then the ability for consumer protection is further diminished. As such, although the emerging value chain opens up innovation and provides more choice, customer security and privacy can be weakened.

While traditional operators can continue to give assurances that their services are more secure and/or guarantee privacy – it is generally not until something negative happens on an OTT service that a customer may value this assurance. In addition large brand names (such as Apple and Facebook) can also be perceived by end customers as trustworthy due to their size and brand image. In return these organisations (if they have not done so already) will need to implement appropriate privacy controls so as to not jeopardise the customer base. As the number of applications with embedded communication services increase then monitoring and/or legal interception through those applications will become increasingly difficult – especially if hosted off-shore. In these cases deep packet inspection of the customers' broadband link is an alternative – subject to appropriate controls.

5.1.4.3. Service availability

Emerging OTT VoIP and messaging services are unlikely to provide contact to emergency services as this will only increase cost and liability for the application provider. In addition, without an identifying telephone number emergency service providers will also have limited data in terms of customer information and location. Whilst this could be addressed through sharing of information from the application provider to the emergency service provider, both parties will need to develop interfaces which incur cost. However, putting aside liability issues, the available technology can now provide advanced "emergency service apps" which use location and customer information on the device, opens voice and video services etc. directly to the emergency service provider at the hit of a button. We are already seeing some services being introduced such as iPhone apps "Emergency AUS" which delivers warning and incident information issued by official agencies across Australia and "Fires Near Me".

Given the OTT voice and messaging applications are generally seen as a complement to the traditional voice and SMS services, we expect that many consumers will be willing to waive their access to emergency services (as they do for Skype today).

Quality of service for OTT voice and messaging is also not guaranteed and is subject to the best efforts nature of the internet and the platform dimensioning of the application provider. In the traditional supply model, PSTN quality has been defined in Code C519 the Standard Telephony Service. This code has been registered with ACMA and applies to Carriers and Carriage Service Providers. The code aims to ensure that consumers receive an acceptable level of performance for the end to end carriage of the Standard Telephony Service (STS) - especially when a call may operate over multiple provider networks.

The call cases covered by the code only include PSTN-PSTN, PSTN-Mobile and Mobile-PSTN. While the definition of Carriage Service Provider can include Internet Service Provider and VoIP Service Provider, C519 explicitly states that it does not cover the use of IP technology within or across interconnecting networks to provide a STS. The code states that the performance levels within C519 have been developed in the context of circuit switched network technology and hence the performance levels (where applicable) are only provisional for IP based call cases.

While IP telephony services are not covered in the Standard Telephone Service code, Communications Alliance has produced the following guidelines for VoIP calls:

- G634:2007 Quality of Service parameters for Voice over Internet Protocol (VoIP) services; and
- G635:2007 Testing Arrangements for Quality of Service parameters for Voice over Internet Protocol (VoIP) services

Unlike the Standard Telephone Service quality code, G634 and G635 are guidelines only and hence there are no reporting obligations or enforcement procedures.

From a technical perspective Ovum understands that VoIP services over high speed broadband networks can still achieve high levels of call quality. However, in congested networks or for application platforms with scalability issues, call quality could become an issue. Whether this becomes a consumer issue depends primarily on whether the service is used as a complement to or substitute for traditional voice and messaging services. If issues do arise with OTT applications then operators may well see this as an opportunity to sell a higher quality (less congested) service. This may over time lead to different service levels depending on affordability and usage. With this distinction it will also be necessary for service providers to clearly explain to consumers the "level of quality" on the products they offer, for example contention ratios and guaranteed access. However, if the basic telephone service is still provided there will be a minimum level of voice service, with the traditional guarantees, available.

5.2 Music Services

5.2.1. The traditional supply chain

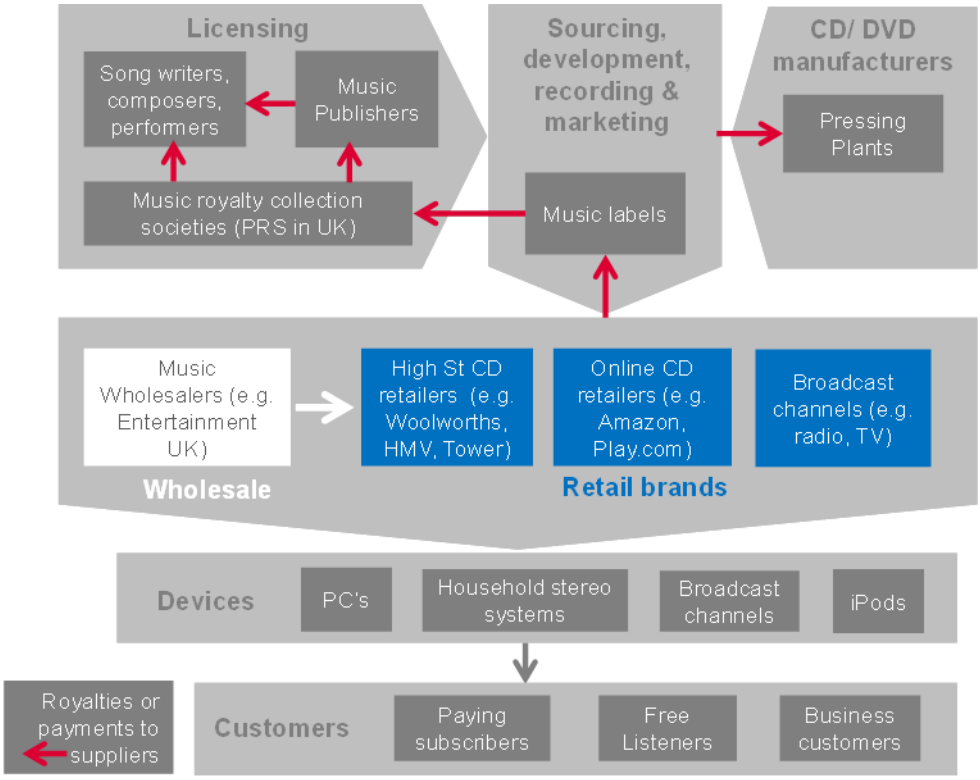
The music supply chain is complicated and variable. This is due to:

- A long list of different types of rights including those for: publishing, performance, broadcasting, recording, synchronising and more.
- Complex historic legacies, which have not yet been ironed out of the system
- An element of government control in some countries and not in others
- A large set of middlemen such as royalty collection societies, publishers, agents, management and record labels.

- Closed national markets due to differing methods, structures, laws and regulations that make it impossible to have an open market for music internationally.

For this reason, the music supply chain may differ between countries, between labels, between channels and even between deals. The representation of the traditional physical supply chain in Figure 5.4 attempts to illustrate the more common form of supply chain.

Figure 5.4: Traditional Physical Music Supply Chain



Source: Ovum

The best way to understand a music supply chain is to identify which entity is doing the 'mechanicals', in other words making the copies. This has normally been (but not necessarily any longer) the biggest revenue stream. In the traditional physical supply chain the responsibility for making the copies rests with the record label, which organises a legal waiver for a pressing plant to produce the copies on its behalf.

Licensing rights holders

Rights holders, shown as 'Licensing' in Figure 5.4, own, control or manage the rights of songwriters, composers, performers (incl. singers) and publishers. The publisher owns rights to the composition, collects performance income and secures music synchronisation opportunities and covers for the songs. This is done mostly through music royalty collection societies, many of which are the result of merging the recording rights societies and the performing rights societies although in many countries these are still separate. International examples of some music royalty collection societies are:

- UK- PRS for Music, PPL, VPL
- France- SACEM
- Germany- GEMA

- USA- ASCAP, BMI, Harry Fox, Sound Exchange
- Japan- RIAJ, JASRAC
- Australia- AMCOS, APRA, PPCA

Record labels

The recording rights owner markets and exploits (promotes) the artists' releases and pays a royalty on sales. The function of the record label is to source and sign artists / acts and songs and record them professionally, promote the records and artists through the media and release recordings in various formats (CD, DVD, download, streaming services) through retailers and digital service providers (DSPs), for consumers to buy.

Traditional music services were and still are to a large extent dominated by the "big four" music labels of Universal, Sony BMG, Warner, and EMI. Following the sales of parts of EMI to Universal, it could now be seen as the "big three" with Universal considerably bigger than the rest of the labels.

Pressing plants

Pressing plants are commissioned by the record labels to duplicate the music master that the record label has helped the artist record and has licensed from the collection societies. These plants duplicate physical music in the form of CDs, DVDs and some other formats for promotional purposes.

Wholesalers

Physical wholesalers of music products have taken the job of storing product, processing and delivering stock to retailers including CD's DVD's and music merchandise. Wholesalers often offer a full point-of-sale (PoS) in store management service as well that keeps retailers up to date and allows the wholesaler to manage promotions.

Retailers

Specialist physical retailers are in a steep decline in most markets, impacted by disruptive competition from online retailers of physical formats such as Amazon and especially by digital service providers such as iTunes and Spotify. HMV, the biggest retail brand in the UK has recently lost its fight against the disruptive competition and closed its doors leaving only a few stores still open. Similar trends are seen in all markets.

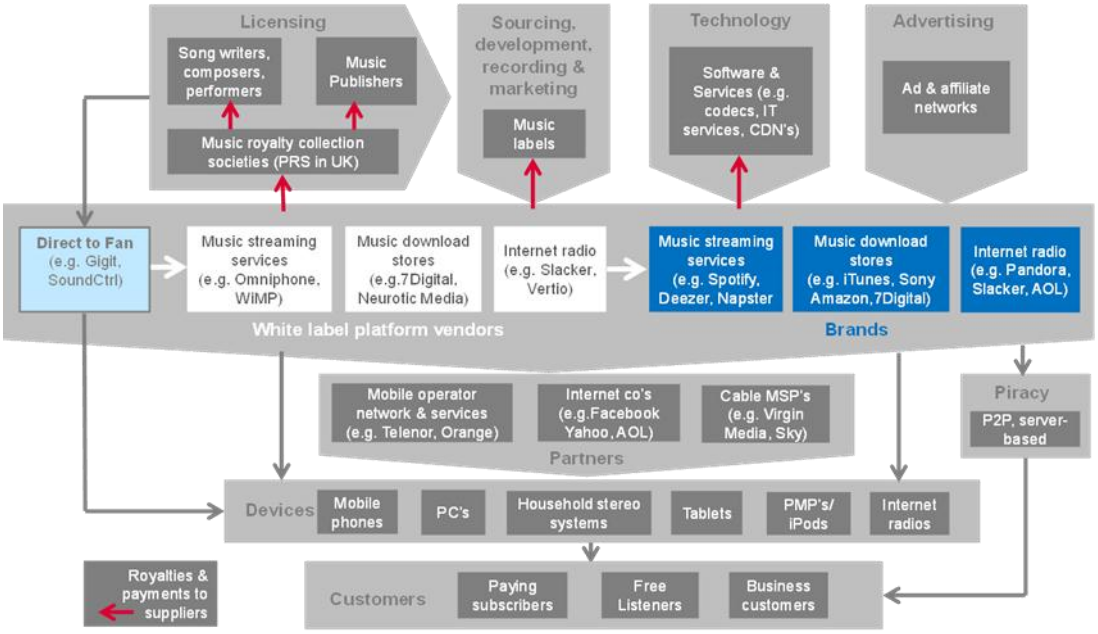
Devices

Consumers are listening to music on a wide range of devices including: mobile phones, tablets, PC's, connected radios and TV's, hi-stereo systems, home theatre sound systems, in-house music systems (e.g. Sonos), iPods & other portable media devices, and game consoles. Such diverse access generates consumer demand for a single familiar music collection that is organised in the same way on all devices. Consequently cloud-based systems especially music streaming with discovery, playlisting and radio are proving popular.

5.2.2. The emerging supply chain

In the emerging supply chain, shown in Figure 5.5, the supply of music value is more fragmented. The music download and streaming platforms, because of digitisation, are now the 'copying entity' and are therefore the companies that pay the main royalty to the music rights holders or licensing organisations, including the record labels. The record label just supplies the masters and related services.

Figure 5.5: Emerging Digital Music Supply Chain



Source: Ovum

This illustration of the emerging supply chain is not the final word, and the supply chain is evolving even further with the following trends worth highlighting:

- *Music applications spread virally*. The nature of music is such that music applications spread virally and are hunted down and spread fast by music enthusiasts. In other words, music apps either grow fast in a country or generally fail. Music apps are not wholly reliant on app stores for distribution as the music apps generally belong to an online music service with a website and therefore have alternative means for pushing music apps to mobile phones.

- *Consumers migrating from ownership to access*. The ability to sell access to music streaming collections of often more than 20 million songs rather than ownership of discrete units of music as downloads is proving popular, with music subscription sales growing at 45% CAGR compared to download sales growth of 11%. Owning being more costly than renting for each new song, streaming has shown enhanced entertainment value especially when combined with discovery services which often have entertainment value in their own right. Diverse use of different devices for accessing music depending on the consumers mode and mood have led to a strong appreciation of music in the cloud and of music streaming services that allow consumers to organise their music in the same way across multiple devices.

- *Mobile music*. Mobile music sales could be growing faster but are stalling in some markets due to inappropriate data plans. Although mobile music usage is growing fast through offline caching offered by music streamers, it is not always clear in the industry figures as these streaming services are often subsumed into subscription revenues for music. Mobile phones have substituted iPods and other portable music players and are increasingly being integrated with household music systems as iPods have been.

- *Piracy*. The ease with which music can be copied and shared has exploded as a result of digitisation. Digital file formats are being copied and shared illegitimately through both P2P networks and digital lockers to such an extent the International Federation of the Phonographic Industry (IFPI) state "around 30% of internet users around the

world regularly access unlicensed sites. That is a global figure, and in Asia the problem is generally worse than the global average. We have to tackle this problem, to protect our present and future business."

- *Direct to Fan*. With the recorded music economy as a whole in decline the size of the cake is smaller. Artists have to compete more aggressively to get noticed and to grab a slice of the cake. For this reason they're not relying on being discovered and developed by labels and are using new direct digital channels to reach and grow their fan-base directly. Digital Service providers are increasingly offering new tools and channels to enable musicians to disintermediate the record label and maximise margin for themselves.
- *Partnering is a popular strategy.* Digital music services of all kinds are finding that partnering with mobile operators, and now big social messaging platforms, is helping to boost penetration, raise profile and drive listening. This is not a return to a walled garden approach (these deal are typically non-exclusive) but a symbiotic approach boosting the reach of the music service and providing sticky value-added services the operator can use to reduce churn. Examples of this approach include Telenor with Spotify and Orange with Deezer.
- *Download growth is expected to falter*. As aggressive competition from music streaming beds in. However, newcomers to digital music, keen music owners, and cloud music "lockers" for downloads such as iTunes Match and Amazon Cloud Drive are expected to support modest growth in download sales of around 10% CAGR.
- *Ringtone sales are expected to continue their decline worldwide.* Ringback tones are failing to make up the difference.
- *Ad-supported music services expected to grow fast in Asia-Pacific*. Both freemium and pure ad-supported music services (such as Baidu Music in China) are expected to grow global advertising revenues fast from a small base. Freemium music services use the free 'entry level' offering to attract users onto the platform; this part of the service is supported by advertising but has historically not generated all that much revenue, at least for western world services such as Pandora and Spotify. Spotify's advertising revenues are estimated to be down to 8% of its total turnover (estimated at around $745m this year. The advertising revenues for a search-engine-based music platform like Baidu Music in China, with a large established user base, could be a very different matter.

A key constraint on change in the supply chain is the complex and costly tangle of licensing structures, organisations and processes, which will prevent the emergence of an international music licensing market for the foreseeable future. The music labels use this situation to leverage their position in deals and negotiations.

Recent licensing reforms in Europe were an attempt to change this. Collection societies or collection management organisations (CMOs), as the European Commission calls them, have historically had a remit to cover only national licensing requirements in their own country. Service providers or other users of musical works were required to license them from individual country level CMOs.

As long ago as 2005 the EC Directive on collective rights management and the multi-territorial licensing of rights in musical works for online uses (Proposal Directive, 2012) included a clause known as 'option 3', that allowed rights holders to appoint CMOs to manage their music across the entire EU. But even though this simplified the territorial element within Europe, it didn't reduce the total number of CMOs because the new arrangements only applied to music producers (not publishers or writers) and only to European markets. Music licensing structures, if Europe is anything to go by, are still as complex as they ever were.

The byzantine nest of licensing interests, structures and organisations will take many years to unwind, so the emergence of a truly open international licensing market for music is still many years away, and may never happen.

That said, in Europe and elsewhere efforts are still being made to simplify these structures:

- The Global Repertoire Database Working Group established in 2009 to work out how to create an international licensing system, using International Copyright Enterprise (ICE) as the technology solution provider
- The Claim Confirmation & Invoice Details standard (CCID) was created to standardise files accompanying invoices and to improve communications
- CISAC has begun to develop a common music information system (CIS) for identifying and exchanging information metadata called CISNet, which would link CMOs' databases around the world.

It is still early days for all these initiatives, and the army of CMOs have by no means committed to adopting any of them currently.

5.2.3. Competition and innovation

The traditional distribution of physical music formats requires the existence of hundreds of thousands of outlets world-wide for the distribution of CDs. However, the emerging digital distribution model requires multiple resellers only insofar as it needs different channels and content to attract different consumer segments and to appeal in different countries and languages. Consequently, the record labels are choosing very carefully who they support back and do business with in different markets, and are doing business with only the minimum number of music services needed to optimise sales in a given market or consumer segment.

So whilst consumers can have more content to choose from in the digital music store than ever before (the digital store front is limitless compared to the high street one), they have much less choice of digital music stores. Consumers still have niche interests in music, but the cost structure for a digital music provider (with high sunk costs) is enough to make the services based on niche demand alone unviable in business terms. Niche repertoire is often provided by the mainstream music services anyway. However, operating niche 'indie' labels is a strong tradition in the music industry and is supported by organisations such as MERLIN (association for independent producers and The Orchard the well-known aggregator of independent and niche labels. Organisations like MERLIN are there to support indie producers on the upstream of the music supply chain, where they are viable. However, an indie-only 'Spotify' aggregator is not commercially viable. eMusic have repositioned themselves as an indie platform, but are struggling as a result.

As is the nature of internet media businesses, the big get bigger and the smaller go out of business or get 'snowballed' into the bigger companies.

Music streaming

The music access model of music streamers is also competing very successfully against the music ownership model of download stores. But the commercial deal for artists for streamed works is controversially low, because of debates over the relative value of different stakeholders in the new supply chain at the time of negotiation. This means a stream (one listen) can pay out only fractions or even hundredths of a cent on author's and publisher's rights and equally tiny amounts for performers and producers rights because the record labels take such a high cut before passing on the rest.

The deals done by the agencies collecting royalties for authors and publishers are based on headline royalty rates from gross revenues or from set "minima" fees (a licensing term for a plural set of minimum fees payable). An example from the UK is shown in Figure 5.6 below. The authors and publishers then get their share of these revenues depending on their number of plays but the size of the total cake is set by the sales of the music service. Record labels (Majors), in effect collecting directly for themselves, performers and producers tend to include a fee per stream element leading to substantial losses for many music streaming services until they can scale. Monies are then passed to performers and producers after a range of deductions in line with the appropriate streaming clause in the contract they have signed.

Figure 5.6: Music on demand (subscription) UK royalties for authors and publishers

Royalty Rate	Headline Royalty Rate	Minima
(you will have to pay the headline royalty rate or the minima, which ever is the greater)	8% (of Gross Revenue)	

Type of Access	Per subscriber per month
Dual Platform	60p
Single Platform	40p
Limited Service (<20,000 tracks)	20p

Territory	UK

Source: PRSformusic.com

For authors and publishers, the share of cake can increase but the size of the cake is always limited to the sales of music subscriptions. The consumer can listen to many more different tracks in a subscriber-based royalty model for $10 per month than the 12 – 20 different tracks that they get for the same price in a CD. So in the end, consumers get a bargain but the authors', publishers', performers' and producers' revenues can be impacted.

With less money in the digital music economy there is less to fund innovation. Innovation is therefore more likely to be around disrupting the supply chain in order to annex greater share of a smaller industry rather than investing in expensive R&D and technological innovation. As a result, barriers to entry are growing for new music services due to high cost of content acquisition and a decrease in funding. For this reason, and because record labels still have a strong grip on the emerging supply chain, many artists are looking to establish 'direct to fan' business models where they forego being 'signed' by labels and grow their own relationships with fans and monetise them through specialist and even mainstream digital platforms retaining more of a smaller amount of money for themselves.

Finally, we must not forget the elephant in the room: piracy. Piracy is the 'competitor' that dominates the industry, particularly in emerging markets. Whilst every pirate is not a music purchaser, the music industry suggests that many could be, and that theft of copyright is still impacting the commercial supply chain. The IFPI have in the past variously claimed that 95% of digital music is pirated, although it now suggests "around 30% of internet users around the world regularly access unlicensed sites".

The debate as to the real impact of piracy on music has never been proven by either side. Only recently, an EU report has suggested that "Taken at face value, our findings indicate that digital music piracy does not displace legal music purchases in digital format. This means that although there is trespassing of private property rights, there is unlikely to be much harm done on digital music revenues." (EU JRC, 'Digital Music Consumption on the Internet: Evidence from Clickstream Data'). The report admits that there could be some negative

impact, however, on physical music sales. The EU JRC report adds that "the vast majority of the music that is consumed illegally by the individuals in [the sample] would not have been legally purchased if illegal downloading websites were not available".

Whether we believe the music industry or more neutral research, it is clear that the piracy threat gave rise to the free access model supported by advertising, and the freemium access model used to attract free listeners and convert them into paying users. Indeed Spotify co-founder Daniel Ek admits that Napster in its original pirate P2P form was his inspiration and reason for starting the company.

5.2.4. Consumer implications

5.2.4.1. Consumer revenue models

Consumer interests are increasingly well catered for, with choice of music and improved delivery for the price of a CD per month. The emerging supply chain has established a number of consumer revenue models to support this delivery:

- *Music downloads*. This download model continues to be popular, but music streaming subscription is catching up with a much higher growth rate.
- *Music streaming by subscription*. This approach is showing, unexpectedly in some quarters, that ownership of music is something the consumer can do without, as long as their access to music offers more choice and a better experience.
- *Freemium music streaming*. Freemium music streaming services such as Spotify that offer a free ad-supported service with limited listening each month, are capable of using personal data from listening habits to correlate musical taste with other imported preferences from sources such as Datalogix, Acxiom, and Bluekai using big data analytics. This information can then be used to support new internet radio channels (see Pandora, Slacker, iTunes Radio) supported with richly targeted advertising. Targeted advertising has consumer privacy implications for any industry vertical and applies to digital music also.
- *Free ad supported music*. In some markets getting consumers to pay directly for music is a habit they have never got into. China is one such digital music market that is dominated by Baidu (main Chinese search engine) Music, a free ad-supported download service fully licensed under deals with One-Stop China (representing the rights of the majors). This means that, at least now, artists and labels are getting paid something in China.

5.2.4.2. Privacy, security and consumer recourse

However, as in other industries the front-end marketing proposition of these new music services is highly attractive, but often diametrically opposite to the hidden 'back-end' proposition of corporate-written 'take it or leave it' terms and conditions and privacy policies.

Consumers wish to maintain their privacy by retaking control of their personal data, and regulators are increasingly helping them to do so. Music apps that are currently accessing the consumer's device set up, location, address book and other personal data will increasingly be under intense pressure from both the consumer and regulators making it more difficult to monetise freemium music services through OBA (online behavioural advertising) or personal data resale.

Security and consumer protection for music services face similar challenges to many other kinds of service. The key application security issue is security of customer data, particularly payment information. The key challenge with consumer protection is the internationalisation of some service providers, but this issue is muted in the music industry due to the national character of most licensing agreements at this time.

5.2.4.3. Service availability and local content

The bandwidth demands of music are such that existing mobile technology can technically support most applications at this time. As the reach of 4G networks increases we do not expect any issues for service availability except in emerging markets where fast networks are patchy. In developed markets the next challenge is whether broadband networks can cope with lossless FLAC format streaming that would return listening quality to that of CDs and beyond.

Local content has proven to be essential for a music services competitive advantage in many countries and cultures world-wide. In countries where piracy is high and national strategies for reducing it poor, like Spain, majors and local labels have declined Going back to 2009 IFPI's head, John Kennedy pointed out that 'there were no new Spanish artists featured in the top 50 album charts this year, compared to 10 in 2003,", "It's getting to the stage where it is nearly irreversible." At the time the IFPI reported funding for new artists was hard to come by in Spain, and that album sales of Spanish artists' fell by over 60% compared to the previous 5 years. Rob Wells of Universal said at the time that "Spain runs the risk of turning into a cultural desert," said Wells, "I think it's a real shame that people in authority don't see the damage being done." The situation has not improved in 2013.

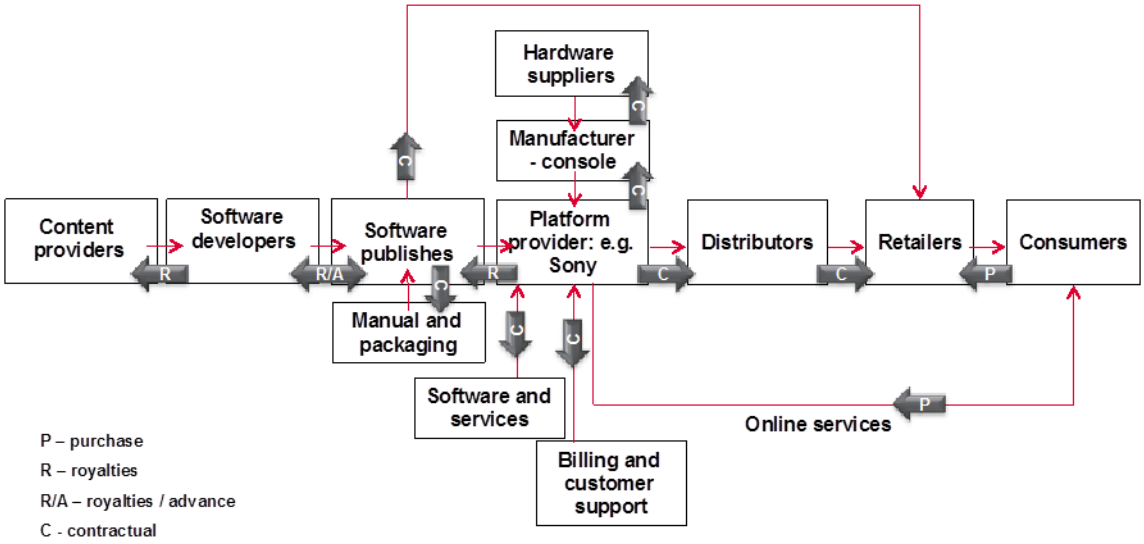
5.3 Gaming Services

5.3.1. The traditional supply chain

The traditional console based value chain, shown in Figure 5.7, is made up of the following key components and players:

- Content providers
- Software developers and publishes
- Platform providers
- Hardware suppliers and manufactures
- Software service suppliers
- Distributors
- Retailers
- Internet connection / broadband access
- Games console

Figure 5.7: Game console value chain



Source: Ovum

Content providers

Software developers (or games developers) are the main player in the creation and development of games. However, some game titles are based on content produced in another medium, say a film, book, a comic-book character, or even a real life personality such as a famous athlete / sports team. In this case the software developer will pay the content owner royalties for the use of that content, brand or name in their game. Content providers are usually third party organisations, but in the case of Sony, it uses its position in the content industry to allow its developers to create exclusive games around its own content.

Software developers

Software developers are responsible for developing the actual games. They can range from a single developer to a large multinational company. They can also be independent or publisher owned. There is a third category, known as a 2nd party developer, which is independent but produces games exclusively for a single platform. The developer relies on royalties on the games it producers, but as the games can take a long time to develop it can also receive royalty advances from the publishers to help fund the game production, which for triple A titles can run into tens of millions of dollars. Top game developers include:

- Nintendo
- Valve
- Rockstar
- Capcom
- Square Enix
- BioWare
- Ubisoft
- Blizzard

Software publisher

Software publishers are responsible for financing, managing and marketing the games. Where required they also negotiate the use of intellectual property from the content players. Large publishers have internal games developers as well as working with 2nd and 3rd party games developers. Large publishers also distribute the games they publish, whereas smaller companies hire independent distributors or larger publishing companies to distribute their products. Large publishers include companies such as:

- Electronic Arts
- Microsoft
- Sony
- Nintendo
- Capcom
- Warner Bros. Interactive.

Platform providers

In the old console world, the platform providers are the large console companies, namely Sony, Microsoft and Nintendo. They are responsible for producing the hardware console, although largely rely on third party manufacturing partners, as well as working with the games publishers and developers to publish games for their consoles. All three companies own in-house games publishers, developers and distributors as well as working with third parties. As consoles have become connected to the Internet, they have also developed their own online platforms that can provide value-add services and content, as well as a direct sales channel to the customer.

Distributors

Games distributors essentially buy games and sell them onto the retailors. They can often belong to the publishers.

Retailers

Retailers for console games have traditionally involved retail stores, either specialist games stores, or more general content retailers or supermarkets. Such companies tend to make little margin on the hardware, but can make relative good margins on the games themselves.

Internet connection

The Internet connection was not part of the original games console supply chain, but as games consoles have become connected it has become an important channel for supply value-add services and goods as well as the games themselves. This capability has added the need for greater IT services in order to host and supply the content via this channel, as well as the need for direct billing and customer support services.

As well as altering the supply channel, Internet connectivity has also altered the revenue model as companies move to a monthly subscription based model rather than pay-per game.

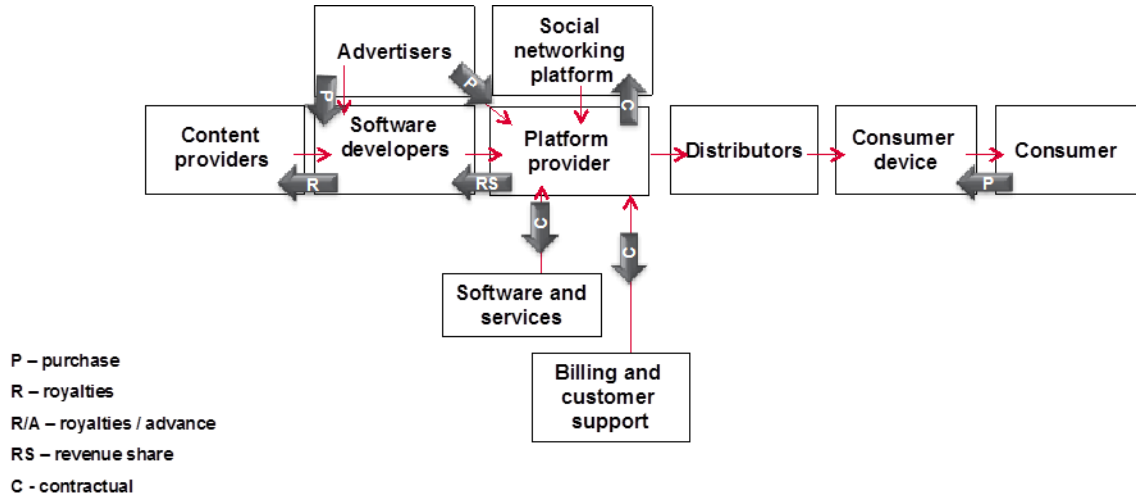
Console

The console itself is traditionally a closed platform consumer electronics device that enables the user to play games. More recently the consoles have also included DVD and audio CD capability and host other types of online applications and content.

5.3.2. The emerging supply chain

There are several other gaming supply chains that are currently present in the market, but the newest and perhaps most disruptive to the gaming sectors is the mobile social gaming supply chain, shown in Figure 5.8.

Figure 5.8: The new social / mobile gaming value chain



Source: Ovum

Compared to the traditional console supply chain, there are three fundamental differences:

- The chain is shorter. Developers can publish their titles directly to a distribution platform (normally in the form of an app store such as Apple's App Store), from which consumers can access that content. There is no need to pay publishers to produce and market a physical product, cutting both the costs and risk significantly. This allows small independent brands such Rovio to enter the market and quickly achieve global success. As well as a tool to enhance the gaming experience, social networking is often used to utilise viral marketing, further reducing the barriers to entry. Many developers use existing social networks such as Facebook, but some companies such as GREE are developing independent social platforms around the gaming experience itself. Many messaging platforms, such as KakaoTalk, are also diversifying into gaming as a way of monetising their messaging platforms.

- Advertising is a much more important revenue source, allowing new freemium models to be created. In-game advertisement models range from simple banner adds to more sophisticated advertiser sponsorships of virtual-goods.

- In terms of devices, mobile social games are normally accessed by standard consumer electronic devices such as tablets and mobile phones. This means that expensive R&D and manufacturing costs are not required. There are some platforms that use a cheaper, online-only console device to connect the platform to a TV / monitor, but with the increasing penetration of connected TVs, this model is likely to be short-lived.

5.3.3. Competition and innovation

The move to mobile social gaming increases the fragmented nature of the gaming market. The big revenue growth is coming from the online / mobile sector and it is expected that this sector will make up approximately 60% of all video games revenue by 2016. Lower cost of entry favours the small independent developers, and the viral nature of the market can mean that the best companies can grow very quickly. The biggest region for growth in this sector is Asia, and therefore it is unsurprising that companies such as GREE and DeNA are amongst the biggest winners in terms of user growth. On the flip side, traditional development houses that focused on developing disc-based games are amongst some of the biggest losers. Mega-hits such as Call of Duty continue to do well, but companies without such Triple A titles in their portfolio, such as THQ for example, have either been forced to cut the workforce significantly, or as in THQ's case, file for bankruptcy protection.

However, physical games developers are not the only ones to have to shift their business model. Online is also shifting, first to mobile and secondly to free-to-play models. Zynga, one of the pioneers of social gaming announced only in June 2013 that it will cut a further 18% of its workforce as it re-focuses its business on the mobile gaming market. Online MMO companies are also starting to shift away from the traditional monthly subscription model to free-to-play in order to remain competitive. Monetising such models though remains challenging as significant portions of users never pay for the game and advertising struggles to bridge the gap.

Given the trends described above, the console gaming market is of course under pressure, and revenues in 2012 declined. However it is expected that the eighth console cycle will start to revitalize the market. In the longer term, it is possible that such companies will also have to move to a greater collaboration and free to play gaming in order to remain competitive, thus signifying greater shifts in the market.

5.3.4. Consumer implications

5.3.4.1. Consumer revenue models

Although pay-to-own and monthly subscription models are still healthy models today, the industry in general is heading towards free-to-play, with even the possibility of console games moving to this model in the long-run. Within the free-to-play market, the main revenue growth is around in-app payments, which is generally preferred by gamers than the free "lite" / paid-full version. Advertising is usually part of a free-to-play model, with the option to pay for an add-free version.

5.3.4.2. Privacy, security and consumer recourse

Mobile social gaming breaks down many of the traditional barriers for gaming and opens up the market to a larger and more rounded social group. The low cost to access games however basically means that games grow by a method of 'natural section', with stronger games quickly becoming global successes and weaker ones cast aside. Successful games are then copied until a new trend takes over. Backed by social marketing, such trends can appear very quickly and become mainstream before any regulator has had chance to react – indeed, when a regulator does react, it is basically because of consumer complaints.

Up until that point, policing is often left to the platform / app store owners, to set content guidelines and filter what it deems to be inappropriate content. To a certain extent not investing in such areas damages the platform's brand, and therefore it is something most

such companies take seriously. However, as social gaming expands beyond casual gaming type genres, setting such guidelines and properly policing them will become increasing difficult. Also, such players have a vested interest in the games generating revenues and therefore may be slow to act on certain types of gaming addiction that wider society deems to be inappropriate.

Probably the biggest controversy around mobile social gaming to date is in-appropriate purchases. Complaints can range from unexpected charges, to accusations of encouraging gambling. As developers come up with more innovative ways to monetise their content, such issues are only set to grow. As other gaming categories also move towards social and free-to-play, concerns around general gaming addiction and inappropriate content are also only going to heighten.

5.3.4.3. Service availability, local content and community standards

One of the biggest technical issues as more high-end gaming titles move into the cloud is short response times. Bandwidth requirements are not as demanding as say video, but low end to end delays are essential if the games are going to provide the quality of experience that serious gamers demand.

Cultural differences are also important if a game service is going to achieve global success. For example battle card games are hugely popular in some Asian countries, but less so in western countries. Also certain content may be deemed perfectly appropriate in one culture but highly offensive / inappropriate in another.

5.4 Video Services

While IP file-based workflows have been the biggest revolution in content production, the biggest revolution in service delivery for video services has not been the connected TV, but the development of on-demand services for video capable PCs, smartphones, tablets, games consoles and streaming video set top boxes.

These devices and services delivered by video content providers have given audiences new levels of control of their in home entertainment viewing experience. They are also redefining the traditional relationship between broadcaster and audience as a customer relationship, and creating new opportunities for services analytics, service personalization and delivery.

The speed of transition to IP-delivered video can be seen in the 2012 and 2013 US Nielsen statistics. For Generation Y and Millenials, linear viewing is falling and web delivered viewing is rising fast. The question is how far and how fast will audience, value, and video traffic shift to IP delivery?

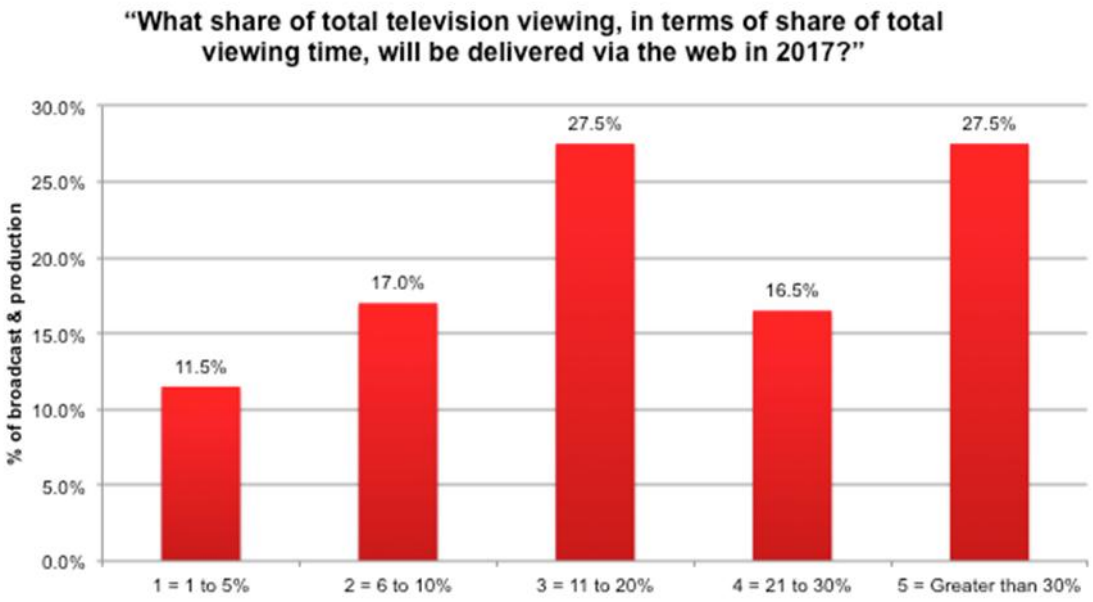
Ovum has recently surveyed 200 senior media executives in North America & Western Europe and over a quarter of those surveyed believe that by 2017 in their markets over 30% of all audience viewing hours will be distributed via the web, a growth of >10X from where the market is today.

Figure 5.9: US transition from linear to OTT video services by age group, 2012 vs. 2013

	Watching linear TV			Watching OTT video (tablet, smart TV, PC)			Mobile subs watching video on a mobile phone		
	q3'11	q3'12		q3'11	q3'12		q3'11	q3'12	
2 to 11	116:46:00	114:48:00	-1.68%	02:45	03:48	38.18%	0	0	
12 to 17	109:15:00	103:47:00	-5.00%	04:25	05:25	22.64%	06:30	07:57	22.31%
18 to 24	113:46:00	106:06:00	-6.74%	07:33	13:34	79.69%	05:25	05:53	8.62%
25 to 34	125:55:00	126:11:00	0.21%	06:30	09:54	52.31%	04:20	05:33	28.08%
35 to 49	143:22:00	145:37:00	1.57%	04:35	06:50	49.09%	03:19	04:47	44.22%
50 to 64	178:29:00	183:58:00	3.07%	03:22	05:00	48.51%	02:53	03:49	32.37%
65+	203:50:00	209:29:00	2.77%	02:35	03:12	23.87%	01:48	02:50	57.41%
2+	146:45:00	148:03:00	0.89%	04:31	06:59	54.61%	04:20	05:25	25.00%
	94.31%	92.27%		2.90%	**4.35%**		2.78%	**3.38%**	

Source: Ovum / Nielsen

Figure 5.10: Industry sentiment of speed of transition to web delivered services



Source: Ovum, n = 250 broadcast, Pay-TV and studio C-level executives

Broadcast audiences are naturally conservative as the poor uptake of the first phase of interactive services demonstrated 2000 to 2010, but the confluence of new digital behaviours, a new set of screens on which to watch video – and in particular the tablet – are creating a fertile environment for service innovation by established players and new entrant OTT content service providers alike, and adoption by audiences. And as we have seen PC based services now pushed back on the TV, so the new innovations being driven through tablet and smartphone based viewing will also be pushed back on the television.

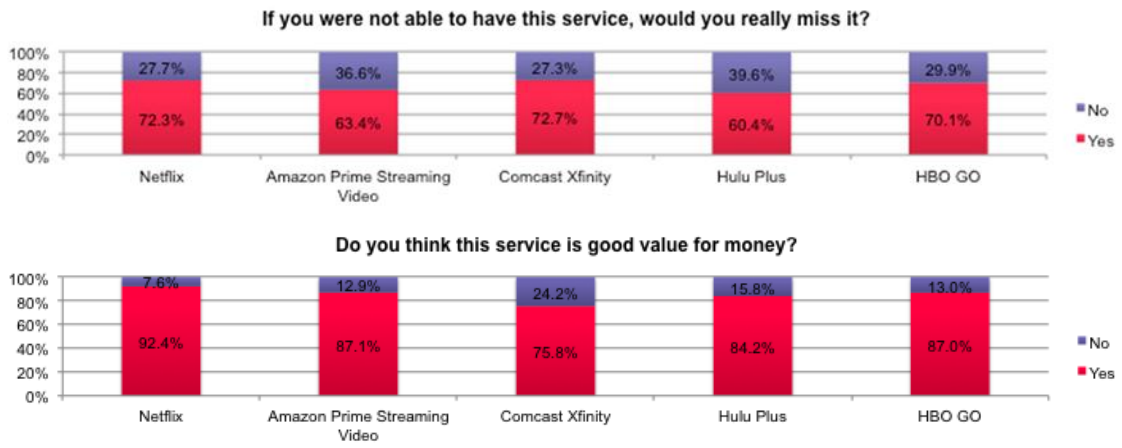
5.4.1.1. Commercial models in transition

Ovum has conducted a review of 453 OTT video services in 43 of the world's top video markets and the findings signal an industry in transition. 100% of all markets have a pay TV operator with a multi-screen service offering a flavour of the TV Everywhere model.100% of markets have one or more local broadcasters with a catch-up service monetized through a license fee or a C+3 or a C+7 model. 89% of markets have a disruptive local player with a pure OTT sVOD or tVODS service, 63% of markets have an operator with an untethered OTT service and just under half of all markets have a free to air commercial broadcaster experimenting with an sVOD or tVOD service bolted onto its catch-up platform.

The reality is that the broadcast market is experimenting with a range of experimental commercial models in the transition to IP delivered services. There is no silver bullet.

We are however seeing a range of market signals that point to future economic models for the broadcast market. Firstly consumers are responding positively to the sVOD model. Recent surveys conducted by Ovum have demonstrated a very high rate of consumer approval for sVOD services such as Netflix.

Figure 5.11: US audience sentiment to OTT SVOD services



Source: Ovum / Nielsen

Secondly, audiences for catch-up and web simulcast services continue to rise. Consumers want to consume free to air catch-up content on web video enabled devices.

Consumers however still respond to two factors that have defined the patterns of in home entertainment for the past 20 years. Triple play content bundling continues to play well with consumers and continues to create an attractive economic model for broadband access players looking to differentiate commodity access products. Consumers also continue to respond to content windowing. While digital flattens windows, the opportunity for fans to view their favourite show or sports team as soon as it becomes available or live, contents to drive consumers to pay a premium.

5.4.1.2. Platform disruption and the impact on viewer behaviour

Two video distribution platforms stand out as current and future disruptive forces in the broadcast market, Netflix and YouTube. Netflix is exploiting the power of the cloud, mobility, social media and big data to deliver a model for the next generation of personalized on demand in home entertainment services, and with scheduling experiments such as House of Cards is creating new consumption models for audiences in what is otherwise is an on-demand platform.

However YouTube continues to be the most systemically disruptive force in broadcast. It is not only changing the economics of video production and distribution, it is also changing viewer behaviour. In the words of Trevor Beattie, founder of ad agency TBWA and creator of some of the most iconic TV ads of the past two decades, the new TV ad format needs to be 5 seconds not the standard 30 or 60 second spot. YouTube has been a catalyst “tapas” style content consumption, it will continue to change formats and is rewarding producers working within both established studios and independents that understand the parameters of consumer preference in this channel. It will also continue to be a lab for innovation new formats and delivery models.

5.4.1.3. Evolution of live and non-live content service models

The multi-screen, pervasively connected web is driving mass media from an audience relationship to a socially connected, interactive customer relationship. While major landmark events such as the Olympics or the Soccer World Cup will continue to be consumed simultaneously by billions of people, the perspective that users take on these events will be increasingly personal, interactive and the experience will become profoundly socially connected with other end users.

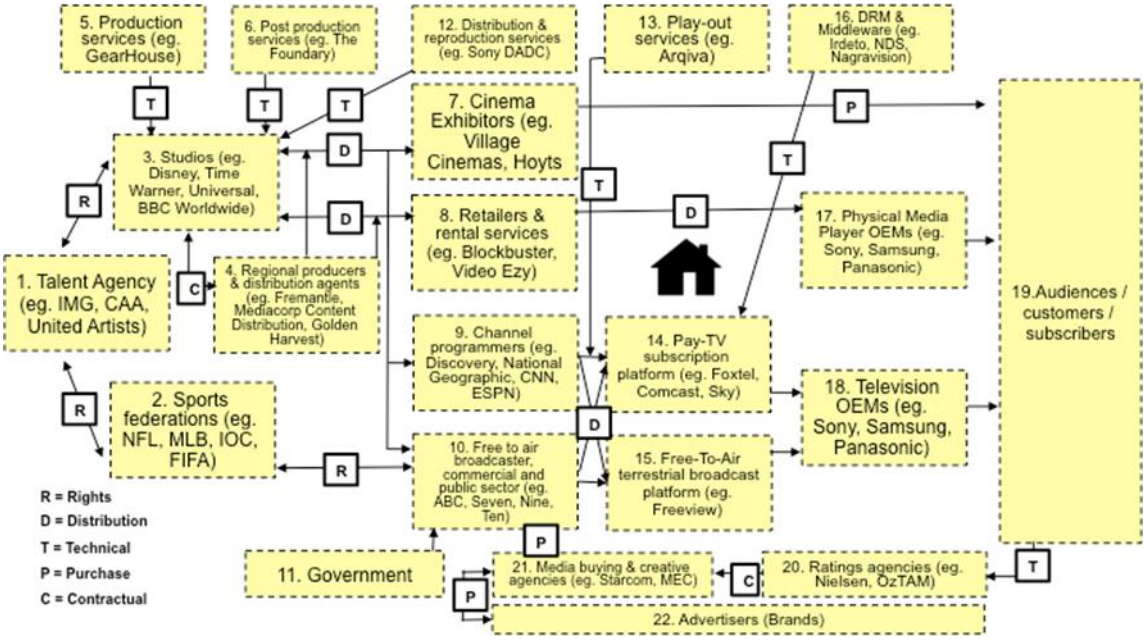
As end users are given more opportunity to measurably interact with content, so this is already driving ad hoc changes in linear broadcast, but going forward as we move from service personalization, to personalization and end-user control of the actual content itself (through "basic" social interaction in live broadcast, to multi-view 3D for live events, multi-threaded documentaries and interactive fiction that blur the boundaries between narrative lean back video entertainment and the bleeding edge of games design or Mechinima-style narrative animation) the choices our social graph make will drive the content that we consume, and the boundaries between user generated content and professionally-produced content will become more blurred. In the long run, will all our media will be in some form be user generated, influenced or curated?

As the audience experience becomes increasingly personal, so how businesses use this attention capital to market to this audience will become increasingly sophisticated, with publishing companies evolving into holding companies for transnational, multi-platform brands and television becoming another integrated digital channel alongside, social, search and display, albeit with some very special properties.

The four technology forces ultimately driving market change - social, mobile, cloud and big data - are ultimately also the building blocks that are enabling the media company of the future deliver service personalization and content interactivity at scale.

5.4.2. The traditional video services supply chain

Figure 5.12: The traditional video value chain



Source: Ovum

1. Talent agencies

Talent agencies represent creative writers, actors, directors and sportsmen and women. They structure commercial deals for their clients, broker the development of films, TV productions and sponsorship deals and manage the settlement of royalties and any negotiated revenue share deals. There are a small number of talent agencies with global reach across filmed entertainment, sports, publishing and fashion. In the case of sports agencies, they are responsible for originating and or commercializing new sports events and franchises. Examples include:

- Creative Artists Associates (CAA)
- William Morris Endeavour (WME)
- International Management Group (IMG)

2. Sports federations

Sports federations act on behalf of their franchise members to market and negotiate rights to broadcast live events across different platforms. Sports federations in general do not provide production services or deliver media services direct to the end user, merely managing the commercializing or rights and sale of sponsorship. However this is changing as mobile and social media creates opportunities for federations to create direct to fan relationships and sell

companion content services that do not threaten revenues from core broadcast services. Examples include:

- MLB
- NFL
- FIFA
- IOC

3. Studios

A small number of major studios dominate global film and television content markets. The businesses operate on a wholesale distribution model only, not offering direct to consumer services themselves with the exception of theme park services. The economic model for the studios is to develop a broad portfolio of creative output, exploit this across a range of content windows and formats, and package weak content with strong content in what are known as multi-year "Output Deals." The major studios are:

- Disney
- Time Warner
- NBC Universal / Comcast
- Sony Pictures
- News Corp / Fox Entertainment
- Viacom / Paramount

In addition there are a number of "mini-major" studios that also produce a significant volume of television or film output that is distributed worldwide. Examples include:

- BBC Worldwide
- ITV Studios
- Fremantle / RTL
- Dreamworks

4. Regional producers and distributors

The major studios can choose to offset production risk by entering into co-financing arrangements with local film and television producers. Or local director or actor talent may seek to develop a property and engage a major studio to ensure global distribution. Local producers may also act as distributors offering local representation in wholesale rights markets, and offering local sales and marketing services. Asian examples include:

- Golden Harvest
- Mediacorp Distribution

5. Production services

Broadcasters and studios can outsource technical production to specialist providers of filmed entertainment services or live outside broadcast production services. In most cases these services providers do not retain rights on content produced, instead charging fixed fees for technical services.

6. Post-production services

Post-production services are offered by specialist studios to add video effects, graphics and colour grade video footage. Again in most cases these service providers charge fixed fees based on time and materials used, rather than retain IP rights. Post-production is becoming increasingly globalized, enabled by the move to digital file based production.

7. Cinema exhibitors

Cinema exhibitors license content from studios and film producers, as well as screening live events, for audiences in dedicated cinema facilities. In recent years cinema exhibition has seen widespread consolidation and have close relationships with the major studios, also acting as distributors for filmed entertainment across other exploitation windows. Traditional cinema exhibitors have not looked to reach consumers directly in the home, but as windows compress for film entertainment, some cinema operators are moving into web distributed video on demand services for films that are made available on video on demand platforms at the same date as theatrical availability. Australian examples include:

- Hoyts
- Village Cinemas

8. Physical media rental and retail

Physical media rental and retail services have been deeply impacted by technical disruption from digital web services. Specialist video rental services such as Blockbuster that offered the opportunity to rent films on physical media such as VHS, DVD or Blu-Ray in a content window soon after theatrical release have seen their market replaced by transactional streaming video on demand services. Likewise non-specialist retailers, for whom DVD and Blu-Ray retail services formed one part of their diversified product portfolio, have seen their sales negatively impacted by alternative web delivered retail models. However retailers such as Wal-Mart and Tesco have responded by their own web-only digital retail services to support studio-led initiatives to support the retail content window, such as UltraViolet. Examples of retailers and rental services providers include:

- Blockbuster
- Wal-Mart
- Tesco
- Video Ezy.

9. Channel programmers

International broadcast groups such as Discovery Networks, National Geographic, and ESPN (100% owned by Disney) produce or acquire rights for live and non-live programming and assemble this content into channels that can syndicated onto any broadcast platform where commercial terms and right allow. The commercial model for channel programmers ranges from a pure wholesale model where a pay TV operator will pay a per household per month rate to carry the channel as part of full channel bouquet, or through to free to air models, where the channel programmer will be seeking revenue purely through advertising. The catalyst for the channel programmer model has been the shift to multi-channel digital television in the last two decades. Such channels tend to be thematic, targeted at a specific demographic and to not hold the top logical channel numbers in the electronic programming guide.

- Discovery Networks
- National Geographic

- ESPN (100% owned by Disney)
- A+E Networks
- HBO (100% owned by Time Warner)

Channel programmers largely operate a wholesale model. The pay TV platforms that pay their wholesale carriage fees own the customer relationship. However relationship is evolving. Web distribution creates opportunities for international channel programmers to engage directly with audiences. Access controlled, on-demand video services enable them to exploit the pay TV operator relationship to create a direct customer relationship, the so-called TV Everywhere model (for example see ESPN 360 and HBO Go).

10. National and regional free to air broadcasters

Market specific broadcasters who are responsible for assembling channels from live and non-live content, many of these players have retained their brand position and technical position in the electronic programming guide as a legacy of the analogue broadcast market where there was a limited range of channels in each market due to spectrum constraints. Free to air broadcasters can be public broadcasters where they are funded through direct taxation or license fee, or they can be pure commercial broadcasters that have secured a broadcast license and generate income predominantly through advertising. Hybrid publicly funded and advertising funded models are also common. The core competence of free to air broadcasters is their ability to optimize production and acquisition of rights, package such rights into channel schedules that reflect the cultural preferences of their audiences, sell advertising, and operate within the compliance requirements of a broadcast license. Examples include:

- ABC
- Seven
- Nine
- Ten
- BBC

While the majority of terrestrial broadcast channels have invested in so called “catch-up” services, and these services have proved to be universally popular, in Western Europe and North American, at year-end 2012, circa 96% of viewing time was distributed via traditional broadcast platforms, although market signals are that this figure will reduce at an accelerated rate due to multi-screen consumption in the home. Broadcast advertising revenues have remained on a steady growth trajectory, due to the natural barriers to substitution created by television ratings currencies, the system for audience measurement. However broadcasters have to respond fast to the impact that second screen services such as social media are having on their delivery model, and the effect this is having on their marketing and audience acquisition operations.

11. Government

National governments have the role of providing licenses to access national broadcast platforms (and by extension national spectrum assets), defining and enforcing the terms of that broadcast license, including content guidelines, and using broadcast services to ensure that cultural groups are appropriately served with mass media services. However many of the traditional frameworks for national broadcast licenses have been disrupted by web distribution, as web video is still largely un-regulated and on-demand services render time based watershed regulation redundant.

12. Distribution & re-production services

The premium media supply chain requires secure logistics services from trusted parties as well as secure reproduction facilities to limited illegal distribution. This segment has been highly disrupted by digital. Examples include:

- Sony DADC
- Technicolour
- Cinram

13. Play-out services

Broadcasters can choose to out-source the technical assembly, distribution and monitoring of broadcast channels to specialist providers use a single facility to serve multiple broadcasters. This is becoming a highly strategic market as the video technology infrastructure and services sees competitive convergence from telecoms infrastructure vendors (e.g. Ericsson, Cisco), business model extension from traditional play-services providers such (e.g. Arqiva, Red Bee, Encompass), and market entry by IT services providers (e.g. Accenture, Tata Communication Services, Atos). As the market moves to towards web delivered services, there is increasingly negative price pressure on play-out contracts as new entrants reduce their margins in order to acquire customers for future on-demand video technical and content services.

14. Pay TV subscription platforms

Pay TV service providers package channels into subscription services that are distributed by restricted access networks, whether satellite, cable, IPTV or conditional access controlled digital terrestrial television. Conventionally this has entailed customer premises equipment in the form a set top box that receives and decrypts the signal from whichever communications technology is being used.

Pay TV operators are a key player in the traditional value chain, and in recent years as the triple play model has taken hold, the ability to amortize the cost of premium exclusive rights, such as sports, has made the pay TV operator more than just a packager of wholesale channels, but a content player in its own right and today in most markets, one pay TV operator dominates as the player that has successfully packaged live sport into a premium subscription product.

Pay TV operators have also introduced a return path into their service platforms, which enables the delivery of video-on-demand services, as well as household level analytics to enabled enhanced customer experience, data services for ecosystem partners such as advertisers and channel programmers, and theoretically targeted advertising insertion, although this later market remains under-developed.

Pay TV operators such as Comcast and News Corp have demonstrated their ability to organically to move into channel programmer operations, particularly for sports and movie channels or to in-organically acquire content production capability such as Comcast's acquisition of NBC Universal. Examples include:

- Foxtel
- Comcast
- BSkyB
- AT&T Uverse

Pay TV operators and free to air broadcasters are continually in a process of negotiation regarding the balance of value and payment for carriage vs. availability of free to air channels on the pay TV platform.

15. Free to air terrestrial broadcast platforms

In most markets, the free to air digital terrestrial broadcast multiplex platform is operated under a single service brand (e.g. Freeview in Australia) and these operations are contracted to a single party, with this contract funded through carriage fees from the free to air broadcasters.

16. DRM and Middleware providers

A range of players offer pay TV platform software and infrastructure products and services to enable creation of secure pay TV platforms. They also provide conditional access systems that control access and distribution of premium content and lobby the major studios to mandate usage of their conditional access systems in premium content licensing agreements. Examples include:

- NDS (now acquired by Cisco)
- Irdeto (owned by Naspers)
- Nagra (owned by the Kudelski Group)
- Microsoft Mediaroom (now acquired by Ericsson)

These technology services providers are having to diversify to compete streaming technology players and internalize the move to web based services.

Also note a range of ODMs offer set top box engineering and manufacturing services such as Cisco, Motorola and Pace.

17. Physical Media Player OEMs

As studios moved to offer films on physical media for retail and rental such as VHS, DVD or Blu-Ray, it created a market for consumer electronics manufacturers such as Sony, Samsung or LG to over media playback devices for retail. These players are now integrating smart TV and video streaming capability into these devices, but compete with alternative devices that can access comparable services such as games consoles, dedicated streaming media devices such as Apple TV or Roku and smart televisions.

18. Television OEMs

The same OEMs produce televisions. The last major functional driver for TV sales was the parallel introduction of thin LCD and LED displays, reducing the physical footprint of televisions and enabling larger panels, plus the introduction of High Definition broadcast services. Today the television remains the dominant device in the value chain, but efforts from Samsung, Sony and Google to make this an interactive device to compete with smartphones and tablets have faltered. No party has offered a smart TV platform to offer a better user experience paradigm than the conventional Electronic Programming Guide, and as such strategies to make the smart TV platform the aggregation layer for conventional and new video services have yet to succeed. Examples include:

- Sony
- Samsung
- LG
- Kogan

19. Audiences / customers / subscribers

Television audiences remain largely conservative and resistant to change in their core television experience. However growing penetration of smartphones, usage of social media

and the expectations of multi-screen, on-demand service delivery due to cloud service usage is changing the relationship between audience and all content service providers. Specifically the implicit relationship between broadcaster and audience and the acceptance that linear services are likely to come with an advertising pay-load does not directly port to a web environment.

20. Ratings agencies

Terrestrial television is of course a broadcast medium. There is no return path. Hence the assessment of the profile of the supply of audience to advertisers by the free to air channels is done by co-funded ratings agencies. Such ratings agencies collect survey data from a limited audience sample to assess what audiences have been viewing and calculate audience share for a particular TV show and hence adverts that have been programmed against it. Ratings agencies are the traditional custodians of the currency of audience measurement and enable the broadcaster to operate at arms-length from the consumer of its service. Examples include:

- OZtam
- Nielsen

With the advent of new ways to measure audiences such as social analytics and set top box data, the ratings agencies are moving to internalize these effects but integrating data from providers such as Twitter, Facebook or TiVo. They will fight to retain their role in the value chain as the "trusted" intermediary and processor of multiple datasets into commonly accepted currencies.

21. Media planning, buying and creative agencies

Media agencies such as Starcom Mediavest buy advertising space up to 12 months in advance of an actual broadcast event based on a forward looking view of the schedules. Media agencies buy broadcast advertising sports in volume, and sell to advertisers according to a media investment plan. In exchange they earn a % on all broadcast media sold to their advertiser clients. Planning is done on the basis of ratings, as supplied by the ratings agencies. Integrated ratings for web video do not exist, hence ruing-fencing broadcast advertising budgets today, and hence revenues both for agency and for broadcaster.

22. Advertisers / brands

Advertisers contribute a share of their above the line marketing budget to invest in broadcast advertising, conventionally to build brand awareness. Major broadcast advertiser industries are fast moving consumer goods, auto manufacturers, financial services and public sector.

5.4.3. The emerging supply chain

The new emerging supply chain for premium video services is radically different in a number of ways. The development of premium video services delivered via the public internet (rather than a managed network in the case of first generation linear IPTV) has led to the emergence of on-demand services, monetized as catch-up television, where a nominal increase is added to the linear ratings score, transactional video on demand, subscription video on demand or "TV Everywhere" style services where a pay TV operators channels are made available to entitled subscribers on PCs, tablets and smartphones.

Web distribution of premium video content is bringing new players into the value chain and changing the role of existing players. Broadcasters are no longer at arms-length from the audience. Web distribution gives the broadcaster an explicit non-anonymised relationship with the end user. It also creates new opportunities for measurement beyond the limitations of ratings agencies, and even the ability to harvest rich behavioural and preference data in

the living room. Social networks have been an intrinsic part of the broadcast landscape in a very short space of time, with data from audience engagement on the second screen being used all along the video value chain, from automating highlights publishing in sports events due following spikes in Twitter activity, to media planners using predictive analytics using social profiling data from Facebook to buy ad spots that will over index for specific audiences they are targeting. The major social nets a core part of the new customer experience model for premium video.

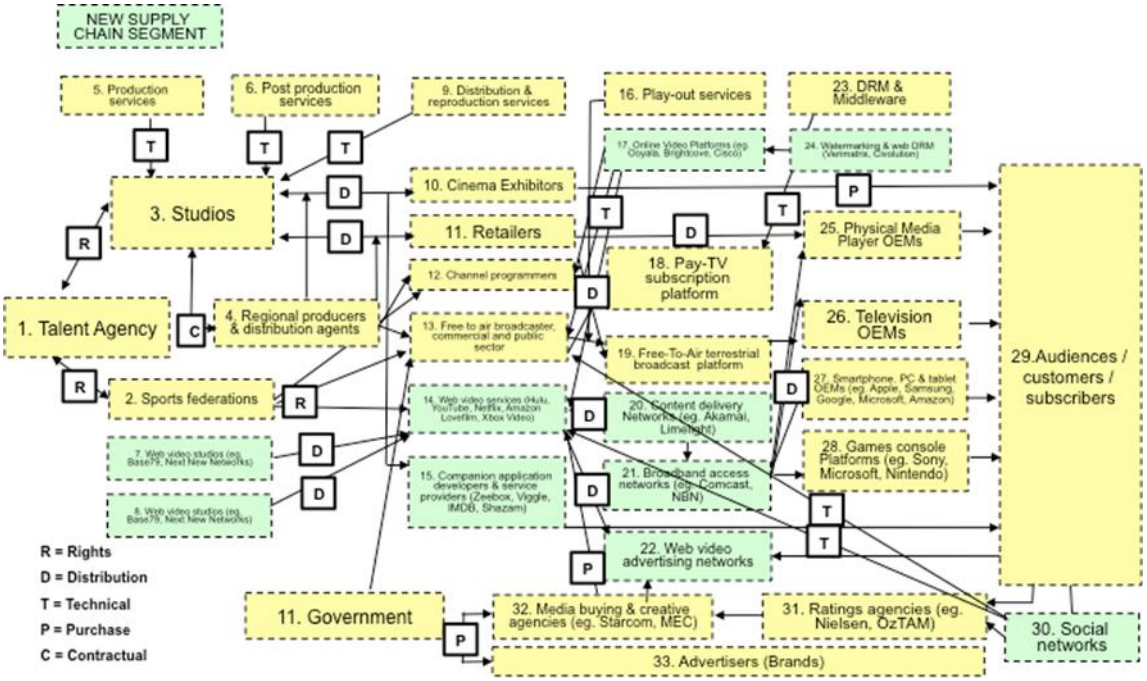
However the market is also seeing major entrants such as Netflix and Google that are looking to domain replace today's pay TV and ad funded broadcast models. Netflix is exploiting the growth in video capable, smart devices such as tablets, smartphones and connected TV's and games consoles to create global subscription video business that has already claimed the scalp of Blockbuster. Please note that Netflix is also exploiting the opportunity that public cloud computing presents to be able to offer service on a pure OPEX basis. It faces none of the technical capital intensity that then traditional broadcast or pay TV model faces. Google is also looking to disrupt the way broadcast runs today and YouTube is a spectre that sits across the whole broadcast market. The scale of its audience and size of video archive creates a natural barrier to entry and natural network effect that makes its reach difficult to ignore, for either content producer or brand. What has held back YouTube to date has been its failure to reach the TV screen in scale. However as audiences begin to gradually diversify their viewing habits onto other screens such as the tablet, audiences are moving to the platforms where Google has real strength.

The network value chain of this new market is also radically different. The growth in web video traffic had driven the development of specialist CDN providers and has driven operators to invest into their wholesale and retail CDNs. Play-out services providers have to diversify into on-demand digital content services and face new direct competition from IT services companies. Traditional broadcast infrastructure vendors that have failed to adapt to a new IP-based, digital file driven workflow for the industry are now distressed and being replaced by a new breed of vendors delivering integrated linear and non-linear service management platforms, hosted on the cloud. Even production services are changing with cloud collaboration platforms reducing the need for centralized broadcast facilities. In the future, the broadcast facility will be a largely virtualized concept.

In this new value chain, the only parties that retain their position are the Hollywood Studios, and the Sports federations. The Hollywood Studios in particular are proving that they have the ability to control pricing and distribution for premium output even on the web. Their major threat is piracy.

These changes have far reaching implications for how broadcast is regulated today, what markets understand by the concept of a broadcast license and which parties in this new value chain have the ability to exert market power.

Figure 5.13: The traditional video value chain



Source: Ovum

As multi-screen web video services grow, it is introducing a number of new entrants to the video services supply chain (these are numbered according to Figure 5.13 above).

7. Web video content studios

The reduced costs of distribution and growing audiences for web video platforms such as YouTube has stimulated the emergence of studios specifically geared to creating professional video content for web video services. These studios source talent from talent agencies, and are funded either through advertising revenue or direct sponsorship from advertisers, so called branded content. This later model enables brands to create dedicated channels of advertorial content on platforms such as YouTube. Examples of web video studios include:

- Next New Networks (now acquired by Google)
- Base79

8. User generated content

The integration of video capture technology into smartphones and the reduction in cost of basic video editing software has catalysed the creation and publishing of user generated video content. Platforms such as YouTube are able to provide massive distribution to such content. End users do not receive a share of ad revenue, unless the video starts generating very large volumes of traffic. User generated content is increasingly being integrated into professional video services, particularly news and sports coverage.

14. Web video services

The market is seeing major entrants such as Netflix and Google that are looking to domain replace today's pay TV and ad funded broadcast models. Netflix is exploiting the growth in video capable, smart devices such as tablets, smartphones and connected TV's and games consoles to create global subscription video business that has already claimed the scalp of

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The traditional video services industry is also attempting to internalize this effect through the creation of its own controlled platforms. Hulu for example is a joint venture between the major US networks, although it currently for sale, and has delivered a common ad-funded catch-up platform in the US, with an subscription service added for customers that want access to premium content and wish to reduce the volume of adverts.

Similarly broadcasters such as the BBC with its iPlayer service has created a web video service portal that delivers a catch-up service in its local market to license fee payers, but outside the UK it is platforms for subscription video on demand services.

A key constraint however for all web video services are rights. In a market where the sustainable economic model for web video services is still yet to be defined, the ability of players below the scale of Google, Amazon, Microsoft or the mini studios such as the BBC is limited relatively. Ovum's perspective is that rather than remove barriers to entry for web video services platforms it actually reinforces them and will crowd out many local and regional ventures. Examples include:

- Hulu
- BBC iPlayer
- Google YouTube
- Apple iTunes
- Amazon Lovefilm
- Microsoft Xbox Video

Please also note that all traditional broadcast services providers have already or are evaluating the deployment of their own web video service platforms. For all parties however the commercial, economic and technical challenge is rights. Rights are still sold on a purely geographical market-by-market basis. Long term output deals limit the flexibility of rights deals, a major challenge given the speed of consumer technology change, and the scope of rights on new platforms remain un-standardized and in most cases ill-defined. This creates poor end user experiences, inefficiencies in the supply chain that increase legal costs, and predominantly serve only the interests of the major studios who are unwilling to unbundle their wholesale content deals.

15. Companion application services

Third party application developers and service providers are creating companion applications for main-stream video services, exploiting the high-probability that audiences will be multi-tasking on a smartphone, PC or tablet while they are watching a television show. This is a very dynamic market today and there are broad variety of service example and commercial models. However they can be broadly grouped into two classes.

The first group are delivered as companion services by a sports federation, broadcaster or producer to increase fan engagement, offer the opportunity for new paid for services that do not conflict with core rights agreements (e.g. MLB At Bat), or create the opportunity to sell display advertising inventory.

The second group have a more strategic function, specifically the gathering of audience sentiment data that can then be used for content recommendation, media planning or media targeting. Typically these applications will integrate social media functions, act as a remote control to effectively "log in" an individual to the television, and aim to supersede outmoded ratings based models of audience measurement. Examples include:

- Zeebox
- Viggle
- Shazam

17. Online Video Platforms

A range of parties are delivering cloud based technical video delivery services to manage the complexity of format diversity and digital rights management. Note that this market is now mature and relatively consolidated. Examples include:

- thePlatform
- Brightcove
- Ooyala (minority owned by Telstra)
- Cisco Videoscape
- Accenture Origin Digital

18. Content Delivery Networks

Content Delivery Networks offer content service providers the ability to reduce their network costs and improve service quality by caching content near to the end user, rather than requiring a call to the origin server. They are the backbone of web video service delivery. Examples include:

- Akamai
- Limelight
- Level3

However telecoms operators are today investing in their own infrastructure and major content service providers are also rolling out their own infrastructure, including Google, Netflix and Disney.

19. Broadband access networks

Fixed and mobile broadband networks are a crucial component of the video services supply chain. While CDNs solve some of the challenges of fixed delivery, the growth video consumption on smartphones and tablets is set to drive the scale of the problem on mobile networks, and particularly next generation LTE networks.

22. Web video ad networks

Change in broadcast advertising is glacial. Ratings systems and the structure of broadcast advertising markets have preserved the traditional value chain.

However the value chain of web video advertising, which is distinct from broadcast advertising today, is radically different. Web video ad networks act as technical aggregators and sales agents for web video advertising inventory. Examples include:

- Freewheel
- Tremor
- YuMe

There continues to be two key areas of experimentation in the broadcast advertising supply chain. The first is targeted advertising delivered via IPTV and digital cable, based on audience profile data held by the pay TV service provider. These services remain in trial phase. The second is structured efforts by some broadcasters to create a detailed data asset around against their audience. For example Channel 4 in the UK is produces second applications that encourage the audience to share information about their status and preferences. Such moves are positioning for the point at which the concept of targeting and an exchange comes to broadcast advertising.

30. Social networks

Social networks ware an established component of the new supply chain for video services. The growth of second screen multitasking is making social platforms, and in particular Twitter, a powerful source of audience data and audience sentiment. The social networks are in reality the primary second screen applications. Feedback from the social networks is being incorporated into live broadcast, social graph preference is driving recommendation, and data from social networks is being used by a range of parties to complement traditional ratings metrics, including channel schedulers, media planners and advertisers. Key social platforms are:

- Facebook
- Twitter
- YouTube

Social networks also play a role in the evolving video services supply as a source of identity management services. The use of federated social identity for service log-in, such as Facebook Connect, gives the social networking platform control of the evolving relationship between broadcaster and audience.

5.4.4. Competition and innovation

Rights continue to be a core source of market power. Exclusive control of sports rights will give triple play operators competitive advantage and already we have seen attempts by regulators, such as Ofcom, to introduce Wholesale Must Offer obligations, where a rights owner is compelled to offer an asset to other competitors at a regulated wholesale price. Likewise the major US studios continue to control drama and file output in international rights markets. On-demand services will undermine the economic production model for much locally produced broadcast content, polarizing video output between the very expensive and the very cheap. This will reinforce the market power of a small number of producers.

However we are seeing service innovation from tier 1 leading broadcasters and new market entrants. Broadcasters such as the BBC, NBC and NHK are experimenting with personalisation of mass media services, using highly complex live events to demonstrate the value in delivering a personalized, socially connected version of mass events such as the

Olympics. These leading broadcasters are putting the systems and processes to deliver the mass media form for the pervasively socially connected, data-driven age. Other broadcasters that are slower to move will simply drop out of the market

Driving innovation are services such as Google and Netflix, which by exploiting web delivery, advanced content search and big data analytics are reaching new audiences and forcing the traditional broadcast market to raise their game. Leading Pay TV operators in particular are copying the Netflix infrastructure model so they to have the ability to move as rapidly into new markets or outside their traditional network footprint.

5.4.5. Consumer implications

5.4.5.1. Consumer revenue models

The consumer revenue model in the broadcast market is changing at a slow pace. The broadcast advertising market remains ring fenced by the defensive wall of ratings systems. However there are signals that the broadcast advertising market is nearing a tipping point as social media and second screen applications play a greater role on advertising planning.

However linear broadcasters are beginning to lose audiences – and youth audiences in particular – to alternative media services and particularly web media services. This impacts the consumer revenue model for broadcaster as fundamentally it is youth audiences that brand advertisers want to reach because their economic lifecycle value is greater than older age groups.

The pay TV model is coming under threat from subscription video on demand models but the power of the content subscription bundling continues to be an important defensive tool for pay TV operators.

The physical media market is collapsing rapidly. DVD and Blu Ray retail and rental is set to be replaced by digital entitlement retail models, where consumers buy a lifetime (or shorter than lifetime) right to access a particular asset on any screen as controlled by an industry entitlement database such as UltraViolet.

5.4.5.2. Privacy, security and consumer recourse

The emergence of on-demand, web delivered content requires a reassessment of broadcast regulation and licensing.

Public sector broadcasting now has a direct relationship with the customer and or citizen. In order to deliver a personalized customer experience to make its service competitive with private sector organisations, a public sector broadcaster will have to create and store a unique identity for all audience's access its services, as well as capturing content consumption and browsing history so that it can deliver service personalization. This creates opportunities for new services. However it also poses a series of questions regarding the nature of the relationship between broadcaster and audience, and shifts the implicit relationship between viewer of free to air programming and advertiser.

As broadcast becomes another source of consumer data, such as social networking platform, who has rights on this data and how will advertising be regulated? Social networks are intrinsically involved and they have greater insight than the ratings agencies. As broadcasters collected "cradle to grave" data assets, it will be important for end users to have a "right to be forgotten."

5.4.5.3. Service availability, local content & community standards

The delivery of web video over the web will create a capacity challenge. Investment in CDN capacity is out of step with growth in web video traffic. This will create Quality of Experience challenges and traffic will have to be prioritized. This will collapse unstructured net neutrality arguments.

Platforms such as YouTube will offer opportunities for hyper local video blogging, but local broadcast services will become increasingly unprofitable to support through advertising as ad budgets shift to digital properties.

Vertically integrated broadcast production will become increasingly challenging to maintain as it will have to compete with very high quality international content and video services. Direct subsidies will be increasingly important to maintain local content production.

On-demand content makes it challenging to enforce traditional broadcasting controls, such as the concept of a watershed before which certain content cannot be shown for minors.

6 Case Studies

6.1 Gree (games)

GREE is a Japanese mobile social gaming company. It is a significant player in the mature Japanese gaming market, but as growth in its home country saturates the company is increasingly also pushing into new overseas markets. It is heavily focused on smartphone devices as they are quickly spreading throughout developed and emerging markets alike – providing a significant global footprint for GREE and its developer partners.

The company makes the majority of its revenues through in-app purchases, although does also generate some revenues from advertising, where it offers a number of business services. Utilizing its Social Network Services (SNS) platform, viral marketing can quickly promote new game titles, reducing the cost of entry for developers. Games are offered for free, but always come with premium features that consumers can purchase using GREE Coins. A single GREE Coin is worth approximately $0.01 and a typical in-app purchase is in the region of $0.50 to $2 in real money. To encourage social interaction within and about games, users are also rewarded with free Coins to spend in the GREE platform.

GREE is becoming a powerful player on the global stage and is increasing its range of partners to further strengthen its position in Western regions such Europe and North America. Its largest market, Japan, however has saturated and the company is investing heavily to expand into new areas and drive further revenue growth. Given the size of its user base, its advertising business is still under-achieving and possibly unprofitable too, and this is something the company must correct going forward. In the search of new revenue opportunities, it is expected that GREE will also move into new content areas.

Social gaming enhances the user experience and is radically changing how games are developed. Mixed with mobile and causal gaming, social gaming is having a significant impact on the traditional gaming market – in both positive and negative ways. The positive for the industry is that gaming is reaching much wider, bigger mainstream audiences than ever before and therefore is creating significant overall growth. The lower cost to entry is also allowing new, innovative companies to enter the market place, allowing for greater gaming innovation and customer choice. However, the traditional houses that were focused on large, triple A titles, are suffering as a result of the overall shift to smaller budget content from independent developers.

The impact on the consumer is also significant with fresh worries about user addiction, easy access to inappropriate content and inappropriate purchasing. GREE takes their social responsibility seriously as it does the security and safety of its users, but with such a fast moving industry together with the desire to also drive revenues, policing the market properly is increasingly difficult and shouldn't be left to private companies alone.

6.1.1. Company background

GREE Inc. is a mobile social gaming business that has developed a social environment based on its SNS platform with features for communication, leaderboards, and social gaming. The company develops its own first party games and mobile content as well as hosting developer partners on its platform. It makes money through selling GREE 'Coins' for purchasing in-game features and content as well as advertising through its ad network business. The company must maintain a stable and value-added customer experience from which to grow members and on the delivery of effective advertising on behalf of brands attracted by GREE's claimed 230 million users. The company is also involved in licensing and merchandising as

ancillary revenue streams and has a venture capital arm for supporting and exploiting start-ups and new talent.

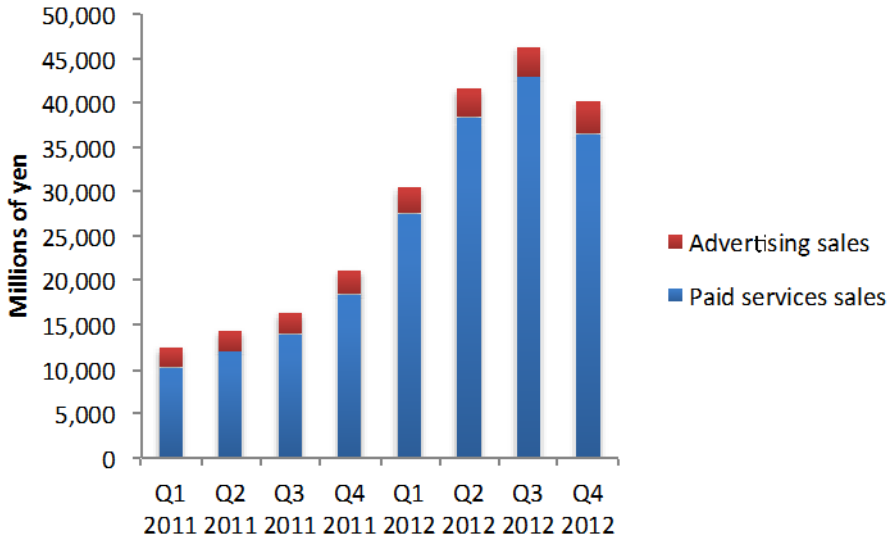
GREE's first service, the GREE social networking service, was launched in 2004, initially on the fixed network platform. The name GREE is derived from a play on the term 'six deGREEs of separation', a reference to the social nature of the company's initial service. GREE was an early entrant into the mobile social networking market in 2005 and in 2006 partnered with network operator KDDI to launch the EZ GREE SNS. Other major Japanese carriers NTT Docomo and Softbank started offering the GREE SNS in the following year.

The company launched its first mobile social game in 2007, with the title Tsuri-Sta (Fishing Star). Fuelled by the popularity of its growing range of social games, GREE expanded rapidly, surpassing 20 million users in mid-2010. As growth slowed in the highly competitive Japanese social game market, GREE has increasingly sought global expansion in recent years, opening offices in key international markets and making several significant acquisitions and strategic partnerships to help achieve this goal. Recent partnerships / acquisitions include:

- OpenFeint (acquisition) - acquired in 2011 for $104m, operated at the time a social platform for mobile games similar to Game Centre with more than 5,000 games and 75 million users. GREE axed the company in December 2012 and apparently transferred users to its own network.
- Funzio (acquisition) – a leading provider of simulation RPG games for the mobile market. Particularly successful in the North American market.
- Mind Candy (partnership) – UK-based publisher of entertainment content popular with children worldwide. Titles include Moshi Monsters, which has generated over $100 million from merchandise.
- Gameloft (partnership) – French-based leading game developer and distributor of downloadable games
- Ubisoft Entertainment (partnership) – creator of Assassin's Creed action game franchise that has sold more than 38 million copies worldwide.
- Monkey Fun – an independently owned mobile game company located in downtown San Francisco. Founded in 2008 on the tails of the first mobile app store, MunkyFun has shipped over 15 high-quality games across various platforms.
- Pokelabo – a strong developer for iOS and publisher in the Japanese market, acquired by GREE in October 2012.

With a rapid increase in its user base, according to GREE's latest financial reporting, net sales have risen by 146% year on year to ¥158 billion. The vast majority of this revenue, as shown in Figure 6.1, comes from paid services sales with the remainder (about 8%) coming from advertising.

Figure 6.1: Quarterly revenues



Source: GREE financial results

Although GREE started out life on the fixed-PC platforms – its focus has quickly shifted to mobile as the growth of smartphones quickly outstrips fixed-devices such as the PC and games console. In emerging markets the penetration of devices such as games consoles is minimal, and is likely to remain so, whereas feature phones / smartphones are quickly becoming the device of choice for the majority of online media consumption including gaming. As well as expanding its subscriber base in developed markets such as Europe and North America, the opportunity for GREE therefore in emerging markets such China, India, and South East Asia is significant.

GREE generates the majority of its revenues through paid social-gaming, but it has also developed a growing mobile advertising business and offers a range of services in this area. GREE's main service areas include:

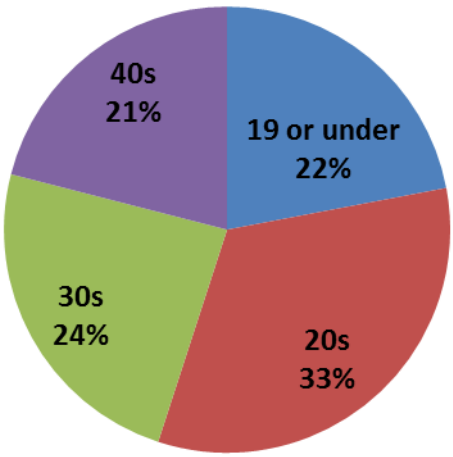
- Social networking – initial primary service launched in February 2004, now reaching 169 countries
- Social games – since the launch of its first game, Fishing Star' in May 2007, GREE has gone on to become one of the most successful mobile social gaming platforms in the world.
- Display advertising – in addition to banner ads and text ads, GREE provides social network-based advertising services such as cross-branded ads and ad applications linked to social games.
- Ad network – GREE operates Japan's largest smartphone-based ad network business through its ad network subsidiary Atlantis Co.
- Affiliate marketing – GREE operators Japan's largest mobile-focused ad business based on the performance-based payment model.
- Reward advertising – GREE offers cost-per-install app marketing to drive app revenue using reward advertising.
- Advertising agency – GREE Advertising offers advertising agency services to support global promotions targeting smartphones.

GREE's platform provides a single SDK to millions of mobile gamers worldwide. The SDK is available for Android and iOS and offers unique user IDs, a social networking service and a number of free-to-play gaming features. Benefits of the platform include:

- Cross platform SDK compatible with Java (Android), Objective C (iOS), and Unity. The SDK provides services via an API suit, including a hard currency solution for iOS and Android and a universal currency on Android (GREE Coins).
- Social features for both the request and share service. The request service allows players to send and receive requests without leaving their game, allowing in-game collaboration and viral marketing. The share service prompts players to share progress at certain points in the game. Both features act as engagement as well as acquisition tools.
- Leaderboard API. Allows developers to post game score rankings to configurable leaderboards, without establishing servers on their end.
- App portal and social networking service (SNS). The standalone GREE app acts as an app discovery portal, whilst the SNS allows social communication. A basic menu screen allows users to navigate between communication and games.
- Games dashboard. Each GREE enabled game is supplied with its own dashboard providing a 'command centre' for users. From this dashboard users can invite friends, see who else is playing, view latest announcements, view rankings and leaderboards, etc.
- Notifications and messages. Push notifications from both other users (via the request service) as well as from the application.

Mobile social gaming in Japan is not dominated by the young, and as Figure 6.2 shows mobile social gaming in Japan is diversified fairly evenly across the sub 50 year old age groups, with the 20-somethings GREE's largest age group.

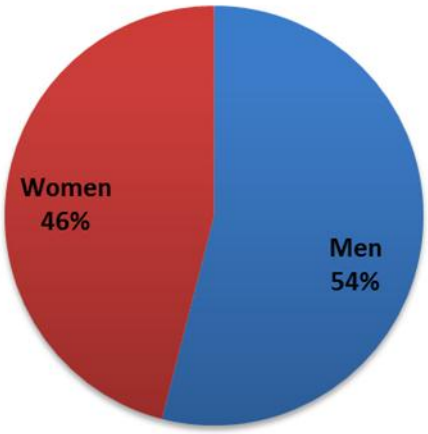
Figure 6.2 Age of GREE gamers in Japan



Source: GREE Financial Results Q3 2013 [?]

Eight per cent more men than women play mobile social games in Japan as shown in Figure 6.3.

Figure 6.3 Gender of GREE gamers in Japan

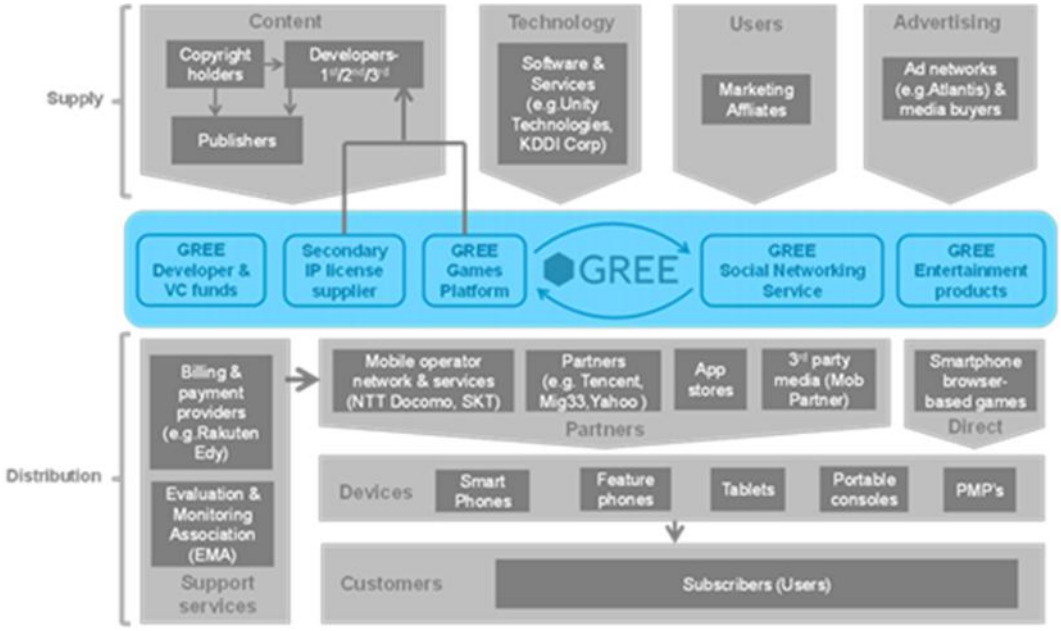


Source: GREE Financial Results Q3 2013

6.1.2. Supply chain analysis

As digital games technology advances on both the supply and distribution sides, the supply chain becomes more complex and the requirement for expert skills, technology and IP increases. The supply chain diagram (see Figure 6.4) attempts to clarify the increasingly complex system, in which, GREE is a part.

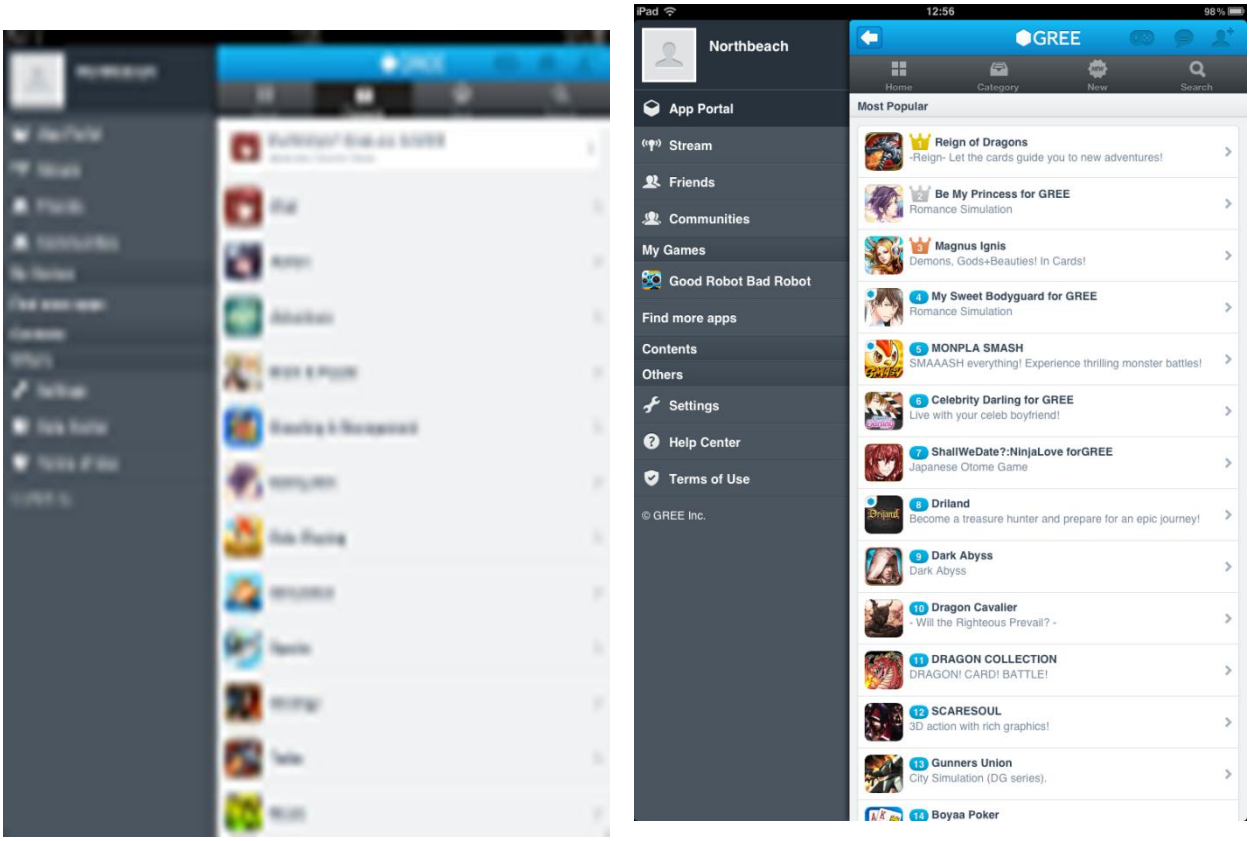
Figure 6.4 GREE supply chain



Source: Ovum

GREE offers games and applications on its SNS from a range of sources including its own first party developed games, exclusive games from second party partners, and third party developed games. Game categories and some of the most popular games hosted on the GREE platform are shown in Figure 6.5.

Figure 6.5: GREE game categories and top games



Source: GREE App on iOS

Content is targeted at both sexes across a range of ages as GREE's user base is well diversified across both genders and most age groups.

Much of GREE's technology has been developed in-house but as the platform evolves more third party technology providers have been pulled into help. For example Unity Technologies have licensed their 3D all-in-one game developer suite to GREE on a free secondary relicensing basis that allows GREE's developer community to develop more advanced games for the GREE platform.

Approximately 8% of GREE's revenues come from advertising generated by selling Internet advertising products and space mainly through banner ads, paid-advertising affiliate programs, and tie-up advertising through their ad network subsidiary, Atlantis Co Ltd. The GREE Ad program creates and runs its own specialised ad units that integrate rich targeting capabilities, social features and functionality from their SNS platform with pure advertising.

GREE partners with a range of mobile operators including KDDI, NTT Docomo, SK Telecoms, and SingTel. These partnerships enable GREE to expand the reach of its social game platform to the mobile network's users as well as provide a secure, trusted and easy to use payment platform.

GREE has strategic partnerships with leading OTT players, including Tencent, Yahoo! Japan, and PayPal amongst others, to expand their reach and enrich their offering. This is particularly important in overseas markets where local knowledge is key to successful development and acquisition of content.

Table 6.1: Examples of strategic business partnerships

Partner company	Reason for Business partnership
Tencent	Tencent aims to enrich the interactive online experience of Internet users in China by providing a comprehensive range of Internet and wireless value-added services through Instant Messaging QQ, web portal QQ.com, QQ Game portal, multi-media social networking service Qzone and wireless portal. GREE stands to increase its reach considerably in China through the popularity of Tencent's services.
Yahoo! Japan	In this non-exclusive deal, GREE and Yahoo! aim to create new value by generating synergies in Internet entertainment through a combination of the media reach and payment capabilities of Yahoo! combined with GREE's social games and original IP. This will be a similar agreement to the one Yahoo! already has with DeNA's Mobage.
Mig33	A mobile community operated by Project Goth Inc. with about 47 million users mainly in Southeast Asia.
PayPal	With PayPal's 103 million active users across 190 countries, GREE intend to benefit from expanded security of payment for users and suppliers further strengthening their mobile social gaming ecosystem worldwide.

GREE's ad service also uses a third party media network, MobPartners to extend its reach to another 150 million smartphone users around the world every month. The company also partners with Free App a Day (FAAP) that helps developers boost the awareness of their brand new apps launched within the last 24 hours.

GREE and its developer community develop games for both Android and iOS selling apps through Google Play and the Appstore as well as GREE's own games platform.

With total active smartphone growth running at 18.5% CAGR in the Asia–Pacific but peaking in Japan in 2013/2014 and entering a shallow decline, it is essential for GREE to aggressively seek out overseas markets such as China and South East Asia that are still showing smartphone growth of between 11% and 17% (average) respectively.

Billing and payment services are particularly important for taking mobile social games to market across a diverse range of developed and developing economies where micro-payments are often required. Consequently GREE has introduced GREE Coin that enables both payment by and the promotional incentivisation of users. Users can obtain Coins by registering with paid-advertising affiliate programs or by inviting friends to register or join certain games, as well of course as purchasing them. Coins can be purchased by a wide range of methods the core of which is provided by mobile operator billing. Other payment methods include credit and debit cards, PayPal and pre-pay cards (Japan).

GREE's Patrol system for managing a safe and secure user environment obtained third party certification by the Content Evaluation and Monitoring Association (EMA) in 2008. GREE claims to run a system that exceeds EMA standards, passing continuous and periodic inspection.

6.1.3. SWOT

A summary SWOT analysis of GREE in Table 6.2 shows three main strategic issues:

- Degraded user experience caused by the Openfeint platform migration
- Strong competition from DeNA Mobage in Japan crowding GREE's space
- Loss of organizational agility caused by fast growth and diversification

GREE appears to recognize only the last of these strategic issues and has already implemented a strategy to address it, but the first two do not appear to be addressed openly by the company.

Table 6.2: Summary SWOT analysis of GREE

Strengths	Opportunities
GREE copyright & intellectual property including native core fan game titles and development capability Established and decentralized third party developer community Integrated ad campaigns utilizing SNS (social) features and pure advertising. Strong strategic partners (Yahoo!, Tencent, mobile operators) GREE in top 10 global game developer sales rankings particularly strong in Google Play. Unique proprietary social game development framework with flexible quick-response development structure Two-layer content safety and security oversight system accredited by the EMA	Strong smartphone growth in overseas markets Smartphone browser-based game channel Consolidate resources behind core native titles Expand GREE advertising network Regenerate user activity through events to boost paid gaming and media consumption for advertising Address growth potential in iOS sector Learn from successful US studios, circulate knowledge and adopt processes Move into other content areas
Weaknesses	**Threats**
YoY 2013 v 2012 decline in net sales (-18%) and profits (-65%) Costs rising along with number of employees Overseas business still losing money but expected to enter the black by December 2013 Platform migration of users from OpenFeint to GREE has caused a number of operational issues and delays in quality improvements. Slowed development speed, some studios lagging Shortage of events slowing ability to boost user activity and therefore spending opportunities Lack of language options for core Japanese titles Weak in iOS titles Closing China studio Customer experience suffering	Smartphone growth peaking sooner and feature phone market declining faster than expected in Japanese market. High-impact regulation creating operational friction and increased costs(e.g. net neutrality, 'Internet use by Young people Act') Competition: DeNA Mobage in particular, and mobile ad network competition. Shorter title franchise life-cycles Lower advertising fees and high advertising cost base Reputational damage due to service issues and declining user experience Possible corruption of GREE Coins through real money trading (RMT) Exchange rates disbenefits Unclear patent rights for internet technology leading to costly legal administration Businesses reliance on founder both strategically and operationally

Strengths

GREE's strong leadership from founder and CEO, Yoshikazu Tanaka, enables it to drive fast decision-making as it builds out its game platform globally through strategic partnerships and acquisitions. The company leverages its decentralized native developer resources as well as second and third party developer community around the world to produce successful games targeting local users. In normal circumstances, GREE's flexible quick response development structure reinforces fast management decision making to create a highly agile company that is capable of exploiting overseas opportunities ahead of its competitors. This has resulted in GREE making the top 10 sales rankings for both Google Play and Apple's App store as shown in Table 3 below.

Table 6.3: Global Game Developer Sales rankings

Google Play ranking:	**App Store ranking:**
1. Gungho Online (Jpn)	1. Supercell (Finland)
2. NHN (S.Korea)	2. Gungho Online (Jpn)
3. WeMade (S.Korea)	3. Electronic Arts (USA)
4. CJ E&M (S.Korea)	4. King (UK)
5. DeNA (Jpn)	5. **GREE (Jpn)**
6. Electronic Arts (USA)	6. Kabam (USA)
7. King (UK)	7. Storm8 (USA)
8. **GREE (Jpn)**	8. DeNA (Jpn)
9. Com2uS (S.Korea)	9. Gameloft (France)
10. Kabam (USA)	10. Zynga (USA)

Source: App Annie, 2012

Weaknesses

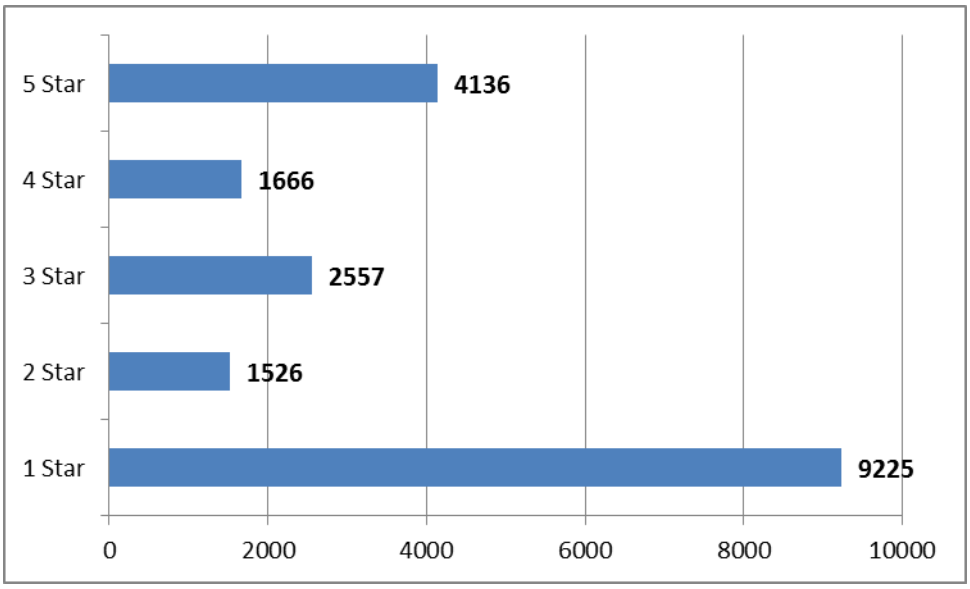
GREE's strengths are currently compromised by a slowdown in studio schedules caused by fast expansion with resources spread too thinly, a problem that is being dealt with through a new strategy known as 'selection and concentration' that has the purpose of consolidating and refocusing resources. GREE also appear to be currently suffering some operational issues possibly caused by platform migration required for creating a global unified platform for the GREE and OpenFeint brands. Openfeint (acquired in April, 2011) is a popular social gaming network for smartphones in the US that GREE closed down, quite suddenly, in December 2012. It is thought that problems with the development of the global unified platform are reflected in comments expressed in Google Play about the decline in user experience and include:

- Purchased GREE coins are buggy, not being recognised and not appearing in games.
- Player and game data lost in the platform migration from Openfeint to GREE.

- Spamming level notifications
- Advertising games to regions who can't download or play them
- Better user experience through game than through GREE app

The resulting reviews (see Figure 6.6 for ranking) gave the GREE app on Google Play an average of just 2.3 stars as a result. With strong competition from DeNA's Mobage GREE cannot afford to allow a poor user experience to continue.

Figure 6.6 GREE reviews on Google Play (24th May 2013)



Source: Google Play

Opportunities

The big opportunity is to ride smartphone growth in selected fast growing and sizeable overseas markets utilizing GREE's agility to establish local development resource and strategic partners for paid distribution and advertising. The company will need to move fast to fix user experience and revitalize studios before this agility can be exploited.

Threats

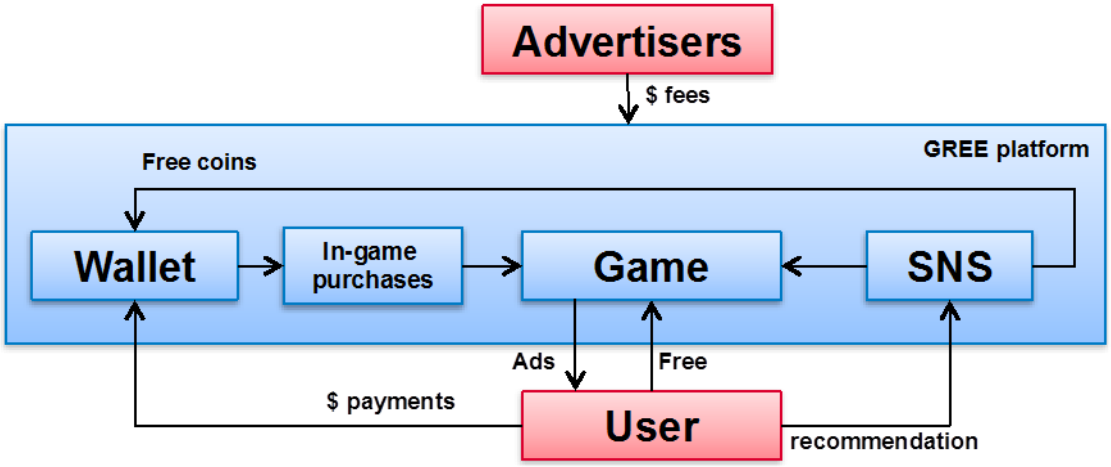
Smartphone growth has peaked sooner and feature phone market declined faster than expected in its home market of Japan. The Japanese market has also been impacted by lower advertising fees and a high advertising cost base. Comments by disgruntled users on English language Google Play about significant numbers of bugs and poor user experience are likely to be creating friction for GREE sales. No surprises then that GREE's social games in Japan are not now expected to generate sales in line with its previous forecast, and net sales as well as operating profit are expected to fall short of previous forecasts as a result. The company has also recorded an extraordinary loss in Q3 FY2013, as a result of a one-time write-off of assets related to game titles. Implementation of the company's new strategy of 'selection and concentration' is expected to increase costs in the short term leading to a downward revision of net income forecasts.

6.1.4. Revenue model

GREE's revenue model, shown in Figure 6.7, is mainly based on in-app purchases and advertising. Most of GREE's services are provided for free via either the Apple or Android app stores. However, some advanced features are available for a fee. Users can obtain points (or

Coins), which are used within GREE, either by being awarded for some type of social activity such as a game recommendation or by purchasing coins. In-game items can only be purchased using GREE Coins. Roughly, the value of one GREE Coin is equivalent to US$0.01. A typical in-game purchase, such as to remove advertising or to purchase a social game item, can cost in the region of 60 to 120 Coins, or US$0.60 to $1,20 in real money. Coins are normally purchased in bundles, although partly to discourage real money transfer (RMT), there is currently no bundle discounting.

Figure 6.7 Gree's revenue model



Source: Ovum

6.1.5. Future outlook

Global smartphone growth is running at around 15% CAGR in Europe and North America and about 20% in the Asia-Pacific but has already peaked in Japan, so overseas markets are key for future growth. However with its acquisition of Pokelabo, a Japanese game developer and publisher with strengths on iOS, GREE will able to exploit its previous weakness on the App store and grow sales in the existing iPhone installed base. The company is also implementing a new strategy, known as a "selection and concentration" strategy designed to make better use of resources and leverage core successful titles, to back 'winning horses' instead of wasting resource. GREE is a major player in the mobile social gaming market alongside its arch rival DeNA and its Mobage platform, with a return to a more agile structure and a selective, focused strategy, the company is well placed to competitively exploit overseas markets aggressively against DeNA. GREE will, however, need to reign in its engineering arrogance and steer clear of overconfidence when facing well-known IT tripwires such as platform migration. The Selection & Concentration strategy summarized in Table 6.4 stands a good chance in achieving its goal of leveraging strengths and refocusing the business:

Table 6.4: GREE Selection & Concentration strategies

Strategy	**Explanation**
Smartphone focus	Prioritize shift to smartphones. Redeploy resource to development of a smartphone browser providing a new marketing and distribution channel option for its developer community that skirts around the revenue charge, and provides new real estate potential for GREE advertising clients. This is an interesting opportunity for mobile networks to integrate and negotiate a cut of a new channel for games that disintermediates the all-powerful app store platforms and modifies the device based ecosystem in favour of the mobile networks and their service provider partners.

Streamline title portfolio and development operations	GREE are intending to focus on backing 'winning horses' only whether globally or locally and support these core titles with improved development, publishing and marketing resources. For example the company will improve the technology and knowledge sharing between GREE and Pokelabo, whose titles are performing well in Japan particularly on iOS where GREE are weak.
Regenerate user activity through events	Increased user activity drives both the purchase of Coin and interaction with advertising driving revenues, but user activity has not been driven forward in recent times. GREE intend to introduce guilds and more major real-time events, and improved cross-promotions as well as fine tuning game balance to revitalize gamer activity on the platform.
Horizontal knowledge and expertise sharing with other markets	High-performing studios such as those in the US and Pokelabo, the new acquisition in Japan will be used as role models to spread knowledge, technology, IP, content and expertise across the GREE Group.

6.1.6. Impact on the market and consumer

Market

Since its establishment of its US subsidiary at the beginning of 2011, GREE has begun to impact the global market as well as the Japanese market where it rivals another giant of mobile social gaming, DeNA/Mobage.

Social gaming in general is having a significant impact on the gaming industry. One might suspect that the traditional industry would be wary of social gaming, and indeed most developers would agree that it has forced them to change how they develop their games going forward. However, on the whole the threats that social and other forms of digital gaming brings are offset by the rapidly increasing customer base and the way that the social aspects of the games can generate a more immersive environment. Unlike other industries that have gone through this IP evolution, the overall impact therefore on the gaming market is one of growth.

However, there are of course winners and losers in this evolution. Major triple-A titles can call for teams of several hundred staff and budgets of $50m. With the shift to much smaller, lower-value games, the number of titles that can support such huge budgets will be significantly reduced. 2012 witnessed major closures of the likes of Sony Liverpool and Eurocom, while other companies such as Zynga, THQ and Popcap all laid off staff. On the other side of the coin, the rise of social gaming and digital distribution channels have opened up new avenues to success for much smaller independent developers.

Consumer

Part of social gaming's appeal to developers is its low cost to entry and immersive nature of the gaming experience. However, it is also exactly these characteristics that worry many campaigners. Low cost to entry not only means that games are more readily available to a growing audience, but it also speeds up the market allowing new trends to enter at an ever increasing rate. The low cost (often free) means that average titles can be quickly discarded and social gaming's viral nature allows hit games to rapidly spread. Such features lead to new fears around gaming addiction – especially amongst children. Parental control tools and inappropriate usage alerts, or often discussed as potential solutions, but are easy to bypass and hard to properly police.

Digital channels also mean that policing the 'sales' of inappropriate content to young or other vulnerable segments is difficult to enforce. It is often left to platform owners, such as GREE, to set content guidelines and filter what it deems to be inappropriate content. To a certain extent not investing in such areas damages the platform's brand, and therefore it is something most such companies, including GREE take seriously. However, as social gaming

expands beyond casual gaming type genres, setting such guidelines and properly policing them will become increasing difficult.

Probably the biggest controversy around social gaming to date is in-appropriate purchases, and GREE has received its share of bad press in this area. As highlighted in the revenue model section of this report, the majority of social gaming revenues come from in-app purchases. Such purchases are small in nature, are not directly paid for in hard-cash, and as they are part of the game can also be sometimes be mistaken as a pseudo-purchase rather than a real purchase. This can lead to unexpected, and sometimes large, payments once the bill comes through.

It is in the developers interest however, especially when they giving the game away for free, to encourage such payments, and in recent times this is where the biggest controversy has arisen. Some types of games, for example kompo gacha in Japan, have been likened to a form of gambling in the way that they encourage users to spend money on the chance of winning prizes. It is reported in Japan that between April 2011 and March 2012, Japanese parents submitted 688 complaints to the Japanese Consumer Affairs Agency about children and gacha games. In one reported case, a middle school pupil racked up US$5,000 in charges in a single month, another elementary pupil racked up charges of $1,500 in just three days. In 2012 GREE, amongst others, announced that they would remove kompu gacha from all their games – shares in the company plummeted as a result of the announcement.

In order to deflect further regulatory scrutiny, GREE established a 'User Environment Improvement Committee, headed by its CEO, together with an external advisory board, and helped establish the Japan Social Game Association (JASGA). The main aim of these internal and external committees and associations is to develop self-imposed regulations, improve customer support and run educational programs (especially amongst the young). There is a heavy emphasis on promoting appropriate use (including usage fees notifications and capping the amount of money minors can spend on games) and strict prohibition of real money trading.

6.2 Netflix (video)

Netflix is the world's leading internet subscription service for enjoying movies and TV programs. It has more than 36 million streaming members in 40 countries including the United States, Canada, Latin America, the United Kingdom, Ireland and the Nordics. For a fixed monthly price, Netflix members can watch movies and TV programs streamed over the Internet to PCs, Macs and TVs. Among the large and expanding base of devices streaming from Netflix are the Microsoft Xbox 360, Nintendo Wii and Sony PS3 consoles; an array of Blu-ray disc players, Internet-connected TVs, home theatre systems, digital video recorders and Internet video players; Apple iPhone, iPad and iPod touch, as well as Apple TV and Google TV. In all, there are over 1000 devices that stream from Netflix.

Netflix provides customers with innovative and effective user interfaces that enhance their Netflix experience and help increase engagement. Netflix has a vast catalogue of movies and shows, but much of its content is old and of limited appeal. To make its service feel valuable, Netflix tries to maximize the likability of the titles and leverages its global scale and billions of hours of subscriber viewing data and algorithms in order to tailor Netflix recommendations and merchandising on each individual user's home page.

Netflix has forced the digital cable, wireless and Internet content providers to continuously improve technologies, content offerings, user interface, and business models to allow consumers to better access on-demand entertainment. Netflix has popularised interactive capabilities including start, stop and rewind that are now standard for IPTV services. The devices through which entertainment video can be consumed are also rapidly increasing in number.

For consumers, the benefits are more choice, greater convenience, and lower prices. Netflix gives consumers more control over how and when they enjoy movie entertainment.

6.2.1. Company background

Netflix was founded in 1997 in Scotts Valley, California by Marc Randolph and Reed Hastings, as a DVD-by-mail service. It introduced the business model of flat-fee unlimited rentals without due dates, late fees, shipping and handling fees, or per title rental fees. It started its subscription-based digital distribution service in 1999. On February 25, 2007, Netflix announced its billionth DVD delivery.

In September 2010, Netflix began international operations by offering streaming service in Canada. In the last three years, Netflix has continued international expansion and now also offers streaming service in Latin America, UK, Ireland, and the Nordic countries of Finland, Denmark, Sweden, and Norway.

Prior to July 2011, in the U.S., Netflix streaming and DVD-by-mail operations were combined and subscribers could receive both streaming content and DVDs under a single "hybrid" plan. However, in July 2011, they separated the combined plans, making it necessary for customers who wish to receive both DVDs-by-mail and streaming content to have two separate subscription plans. As a result, the Company has three operating segments: Domestic streaming, International streaming and Domestic DVD. The Domestic and International streaming segments derive revenues from monthly subscription services consisting solely of streaming content. The Domestic DVD segment derives revenues from monthly subscription services consisting solely of DVD-by-mail.

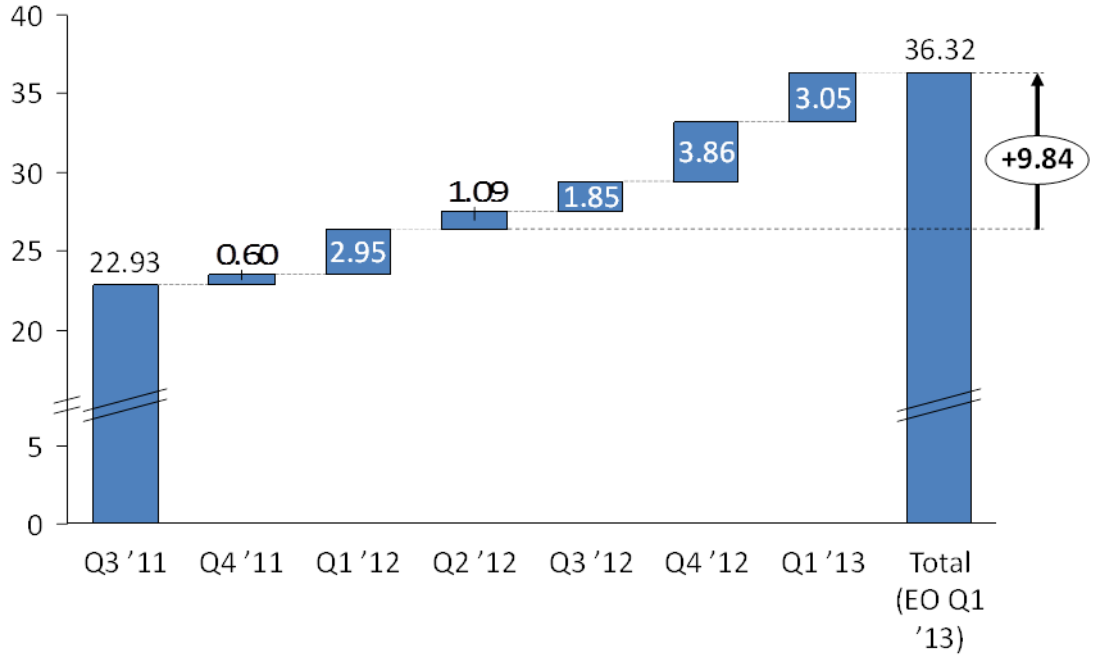
Netflix now accounts for about a third of all downstream Internet traffic in North America on an average weeknight. The master copies of all the shows and movies available to Netflix take up 3.14 petabytes of storage space. (In comparison, Facebook uses about 1.5 petabytes to store about 10 billion photos. An hour of video for the iPhone would be about 150 megabytes.) The compressed catalogue comes to about 2.75 petabytes.

According to Justin Fox, editorial director of Harvard Business Review, "It is becoming the mistletoe of the media business — a parasite (sort of) that is more prominent and beloved than its hosts."

Netflix's customers watch about 4 billion hours of programming every quarter on more than 1,000 different devices. To meet this demand, the company uses specialized video servers scattered around the world. When a subscriber clicks on a movie to stream, Netflix determines which server containing that movie is closest to the user, then picks from dozens of versions of the video file, depending on the device the viewer is using.

Netflix is demonstrating the ability to deliver, manage and create content profitably. Over the past quarter, streaming subscriber net acquisitions were 3.04 million and almost 10 million over the past four quarters. Similarly, contribution profit expanded from US$8.7 million to US$54.4 million in one quarter, or even more dramatically, from a loss of -US$30.2 million to a contribution profit of US$54.4 million on total paid streaming members in just four quarters. Profit contribution per streaming paid member increased to US$1.59, a full reversal of its -US$1.24 in the quarter a year ago.

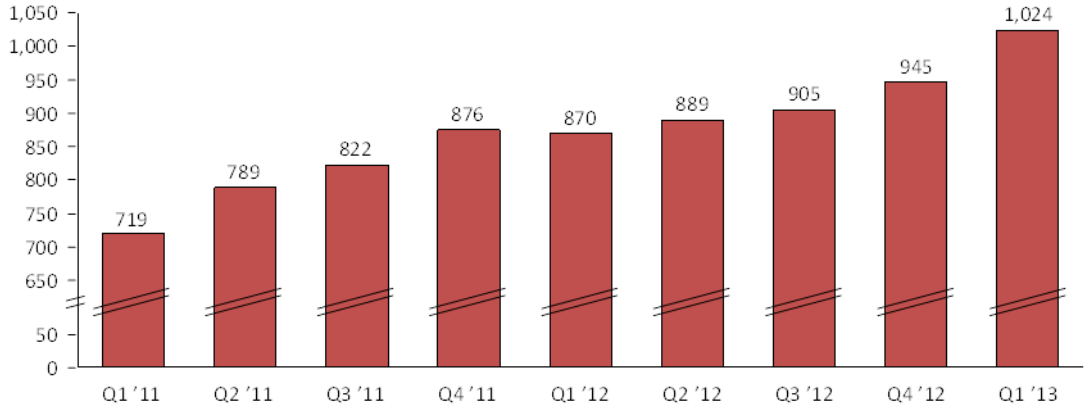
Figure 6.8: Subscriber addition- Netflix (in million)



Source: Netflix

Netflix has a very simple consumer revenue model. It offers commercial-free unlimited-viewing subscription TV. They don't offer pay-per-view and do not stream advertisements. Netflix's revenue model can be summarised as charging subscribers a monthly fee of US$7.99 a month to access unlimited movies and TV shows streaming over the Internet to PCs, Macs and TVs via a wide range of devices. This offer limits the subscribers to two simultaneous streams. In response to widespread password sharing, Netflix has recently announced a new subscription option offering four simultaneous streams for US$11.99.

Figure 6.9: Revenue- Netflix (in million USD)



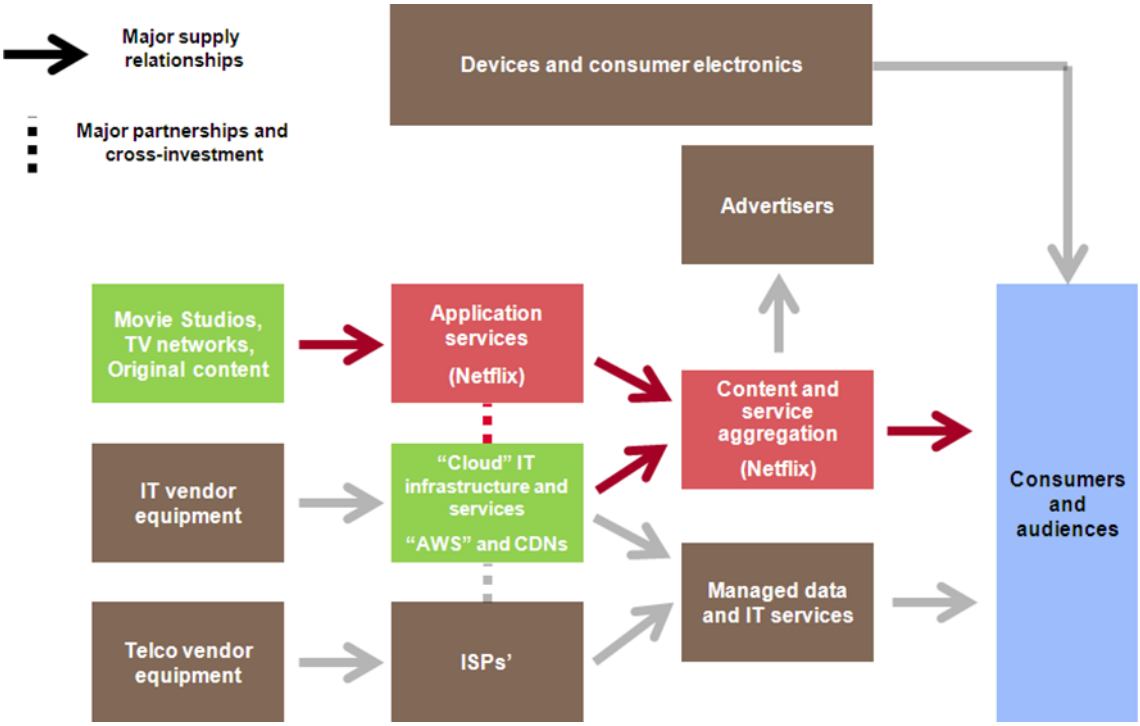
Source: Netflix

Netflix is currently spending US$350 million per year to improve their services, and are spending US$2 billion per year on content licensing and original shows. The "vast majority" of this spending goes to licensing movies and prior-season TV shows, with a small proportion of it going to their recent original content efforts.

6.2.2. Supply chain analysis

Netflix competes in an industry where control of distribution channels was traditionally the key to success. Whoever owned the pipes, owned the customers. Today, Netflix piggybacks on distribution networks built by others. For DVD delivery, that distribution network is at least a neutral carrier: the U.S. Postal Service. For streaming though, Netflix relies on internet service providers such as Comcast and AT&T, data centres owned by Amazon, and tablets and digital media receivers made by Apple (and Microsoft, and Samsung, and others) to get its movies and TV shows to customers. All these companies are much bigger than Netflix and are all direct or potential competitors. Yet it survives and, for now, thrives among them.

Figure 6.10: Digital supply chain - Netflix



Source: Ovum

Content Providers

Netflix obtains content from various content providers through streaming content license agreements. The vast majority the contents are movies from studios (like The Walt Disney company and its renowned studios including Disney, Pixar and Marvel) and prior-season TV shows from other cable and broadcast networks (like Warner Brothers Television and Fox Television). It licenses content from multiple suppliers in each country market, mirroring the fragmentation of the content industry. Typically Netflix bids for exclusive access to the subscription video-on-demand (SVOD) rights.

Netflix is very calculative in its content buys. The company puts actors' names and the show type through its algorithms to determine the likely size of an audience. Netflix's licensing is all time-limited, and at the time of renewal, it evaluates how much the title has been viewed as well as member rating feedback to determine how much it is willing to pay. How many similar titles it has is also a consideration.

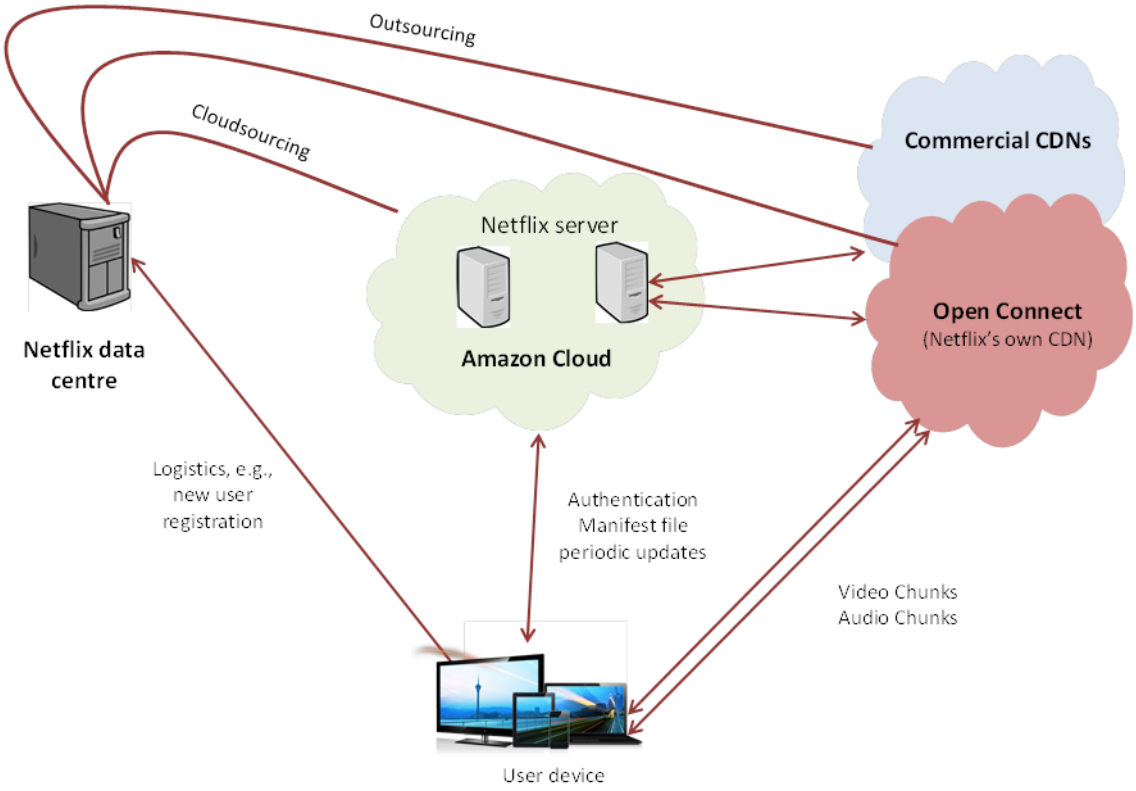
Content providers use a Netflix system called Backlot to send encrypted files via the Internet. Netflix then compresses the files and creates more than 100 different versions, each tuned for the varying bandwidth, device, and language needs of its customers.

Recently, however, Netflix has been expanding into original content, which premieres exclusively on Netflix.

Cloud IT infrastructure and Services

The architecture of the Netflix system is illustrated in Figure 6.11.

Figure 6.11: Netflix Network Architecture



Source: Ovum

The components of this architecture include:

- Netflix Data Centre

The main functionality of the Netflix data centre is to register user accounts and capture payment information. It also re-directs the users to the movies or signup page depending upon the user status.

- Amazon Cloud

Amazon Web Services ("AWS") provides "Netflix" a distributed computing infrastructure platform for business operations or what is commonly referred to as a "cloud" computing service. Netflix has architected its software and computer systems so as to utilize data processing, storage capabilities and other services provided by AWS. Except for Netflix data centre, most of the Netflix servers responsible for content ingestion, log recording/analysis, DRM, CDN routing, user sign-in, and mobile device support are served off the Amazon cloud.

- Content delivery networks (CDNs)

CDNs deliver the content to the end users. The contents are sourced in Amazon cloud and copied to CDN. Until recently, Netflix had partnered with commercial content delivery networks (CDNs) in the likes of Akamai, Level3, and Limelight to get its movies and TV shows to customers' devices. But on June 2012, Netflix announced its own content delivery network- "Open Connect".

ISPs can directly connect their networks to Open Connect for free. ISPs can do this either by free peering at common Internet exchanges, or can save even more transit costs by putting Netflix's free storage appliances in or near their network. Netflix's new platform allows

network operators to provide higher quality streaming and more importantly, gives them control over the video that flows through their pipes. Major ISPs around the world have already connected to Open Connect, including Frontier, British Telecom, TDC, Clearwire, GVT, Telus, Bell Canada, Virgin, Cablevision, Google Fiber, Telmex, and more.

- Application Services

This is Netflix's core competence. Netflix has continued focus to refine its technology, user interfaces, and delivery infrastructure to improve the customer experience. For example, its "adaptive streaming" technology automatically and constantly optimize the streaming bit-rate to each user's Internet speed. This minimizes loading and buffering times, delivering the best click-and-watch experience. It has programs in Super HD and with Dolby Digital plus 5.1 surround sound for a high quality, immersive entertainment experience.

Netflix has been forced to build from scratch much of the software it needs to operate. Since it relies on Amazon for data centres, its engineers focus on coming up with tools for, say, automating the ways in which thousands of cloud servers get started and configured.

For example, each night Netflix performs an analysis to see which shows were the most popular where. From 2 a.m. to 5 a.m. local time, it fills its servers with the appropriate programs. The most popular videos go on high-speed flash storage drives; everything else gets stored on cheaper, slower hard disks.

6.2.3. SWOT

Strengths

Netflix is accessible to "any screen, anywhere, any time". Streaming service is available on laptops, cell-phones, tablets, game consoles and internet-enabled TVs.

Netflix has a simple revenue model that is easy for consumers to understand. It offers free-trial memberships to new customers and furthermore, customers can leave when they want with its simple online cancellation and come back when they want.

Netflix has built a broad and deep content library leveraging its substantial scale and significant content budget. This gives Netflix a strong advantage over its more localised linear competitors when it comes to launching a show or licensing.

Personalizing promotion of the right content to the right member is a key component of Netflix's success.

Netflix is reputed as the highest payer in Silicon Valley. Managers routinely survey salary trends and pay their employees 10 per cent to 20 per cent more than the going rate for a given skill which ensures they attract and retain the best possible talent in the industry.

Weaknesses

Netflix doesn't own the most of the content it provides, and the highest-quality content isn't generally available. Often Netflix pays for dated, second-tier content that has no value in any other window.

Even though Netflix has the first mover advantage, TV distributors and some other technology companies are in a better position to license quality content over a longer horizon due to their existing long-term relationships with the big content producers.

Netflix is constantly losing content as licensing deals expire, forcing it to sign new deals at higher prices, and pay to develop its own shows.

Opportunities

International expansion to capture new markets and revenues is a significant opportunity. As Netflix expands overseas, it intends to strike worldwide licensing deals instead of hammering them out country-by-country. From a studio perspective, that could give Netflix the ability to deliver scale and come up with lucrative terms that no regional competitor could match.

Film and television producers have always used data, holding previews for focus groups and logging the results, but as a technology company that distributes and now produces content, Netflix has access to data about consumer sentiment in real time. This data is already used by Netflix internally, but can potentially be monetised by profiling customers for advertising.

Netflix's existing revenue model is all about acquiring and retaining customers, but it can open up new revenue streams such as licensing its original content or even a branded channel bundled with traditional distributors.

Threats

Netflix no longer enjoys a first mover advantage, and its competitors are closing the gap. Low barriers to entry are raising the level of competition. Entry into the content streaming business only requires the capital to acquire content, the ability to assemble cloud infrastructure deals, and the requisite software skills, all of which can be reproduced. Netflix revenue is customer sales based and customers' loyalty is crucial but vulnerable.

Cost of content acquisition is escalating. As there are increased numbers of competitors, there are more bids for content, resulting in rising costs. But number of quality content suppliers is limited and success of Netflix depends on successful licensing deals with the content owners. Illegal content distribution also remains a significant threat to Netflix and other legal aggregators.

Netflix heavily relies on unlimited bandwidth for its streaming offering, and this is placing pressure on ISPs. Broadband ISP providers could move to a pay-for-use model, raising the overall cost of Netflix services.

6.2.4. Future outlook

Netflix is committed to increasing the amount of original and exclusive content on its service. Greater satisfaction with content leads to greater member engagement and lower churn. Netflix had great success with its original content, House of Cards, and better initial uptake with Hemlock, one of its most recent releases. But production is expensive, and Netflix has announced and identified only a few more series in order to contain costs.

Netflix is undertaking three new initiatives to improve the streaming experience:

- Netflix is individualising service profiles so that it can provide personalized recommendations to different members of a household
- Netflix is utilizing social media for better content discovery by its members. It is also leveraging both social media and proprietary data to provide recommendations to its members
- Netflix has released a new player for Smart TVs and set-top boxes for faster playback.

Netflix benefits from increased global penetration of more sophisticated mobile devices. More and better devices enhance the mobile video viewing experience.

Netflix is currently rolling out its own CDN infrastructure to handle 3D and higher-quality HD content, and to facilitate its commercial relationships with ISPs.

6.2.5. Impact on the market / consumer

Consumer

Netflix has enlightened consumers about the advantages of on-demand content, available from any device, with no advertising. It rapidly changed the manner in which consumers view entertainment video. Netflix is leading this wave of consumer change and growth of Internet TV by providing broad, click-and-watch video entertainment video. Netflix is acutely aware of its subscribers' binge-viewing behaviour and elected to nourish it with the release of all 13 episodes of "House of Cards" at once. Netflix engages audience in the manner they like to be engaged.

However, with such easily accessible entertainment, people may feel an urge to watch shows on their phones during work, cutting down on their productivity. This easy access to movies and television may be disruptive in class or work because it can be such an easy distraction. This has become an enterprise management concern. Many large companies have already blocked popular leisure sites like Facebook, Pandora, and Netflix to save bandwidth and increase productivity. For example, in 2012 Procter and Gamble blocked Netflix along with some other popular leisure sites to keep employees focused on their job.

The information required for Netflix, however, is only basic and not particularly intrusive, only making the consumer gives up basic information in exchange for the nearly unlimited access. Of more concern is Netflix's extensive database of movie preferences and movies watched, and the integration of social media into the Netflix offer. In 2013, Netflix rolled out social media features that allow users to see what their Facebook friends are watching, and vice versa. Sharing with Facebook is opt-in, but everything watched is shared automatically. The United States was one of the last Netflix countries to get this feature, due to an old law against disclosing people's video sale and rental records. The law was amended in January 2013, after lobbying by Netflix.

The video store industry has been severely affected. Now that Netflix has made this process of obtaining a movie is so much faster paced, the convenience of Netflix is highly valued compared to the old video store experience.

Netflix includes parental controls that enable customers to configure available titles according to the preference. The video-streaming site contains a world of movies and TV shows with different content ratings. Some titles are targeted primarily at mature audiences, while others are targeted at children. Each title includes a rating such as PG-13, TV-14, NR or G. Some titles even have a mature rating (M). Ratings are based on the level of adult language, violence, substance use and sexual situations. The more explicit or pervasive is the language, violence and sexuality, the higher is the adult rating.

By default, Netflix keeps a record of all of account viewing activity. Reviewing this information enables customers to see what is being watched and helps to set necessary parental controls. This potentially could create privacy issues if this data is not properly secured.

Market

Following the success of Netflix, along with the other streaming business players, most of the world's leading linear TV networks and movie studios are moving into Internet TV. Warner Brothers has also decided to leap into the streaming business with Warner Archive Instant. The WatchESPN app runs on many Internet platforms and is specifically designed to showcase sports. ESPN will keep improving their app to try to stay ahead of MLB.tv, which is another Internet TV sports app. The HBO GO app makes HBO's films and series much more accessible than on HBO's linear channel. The BBC iPlayer app in the UK provides a rich and popular on-demand interface for a wide range of BBC programming. The other major linear networks are not far behind.

Quality content is the key success factor in online streaming business. Unfortunately, it is the highest quality content that is hardest to obtain. The competition in this business segment is fierce as the barrier of entry is low. As a consequence, increased number of competitors is bidding for limited quality content. The content producers naturally welcome the new bidders on board and this competition is rapidly increasing the cost of content acquisition.

The more successful Netflix is, the more important it is to the ISPs' subscribers, but ISPs carry the burden of provisioning bandwidth to support the service. ISPs are working closely with Netflix on the distribution of network interconnection points to ensure that the ISP subscribers actually experience the benefits of their high-speed Internet. To this end, Netflix's Open Connect CDN network allows ISPs to directly interconnect with Netflix. Open Connect is now serving the "vast majority" of Netflix video in Europe, Canada and Latin America. Netflix has not clarified exactly how much of their traffic that is, but did say back in June 2012 that more than 50% of its traffic in the UK alone was coming from the new CDN platform. Netflix is aiming to have all customers served by Open Connect as soon as possible and we estimate it will take 24-36 months to have nearly all of its international and U.S. video streams being delivered from inside affiliated ISP networks. But there is growing concern about Netflix's plan to only offer the new content to ISPs that participate in its Open Connect initiative which could affect competition in the ISP market.

6.3 Skype (voice and videoconference)

Skype, released in 2003, is peer to peer software that enables its users to make free voice and video calls by routing the call through the internet. Skype's value proposition for the customers is free of charge, secure, high quality voice service which contradicts the paradigm of traditional telephone companies. Skype is already a part of many of user's lives and it aims is to continue to help them easily communicate with their friends and loved ones every day, at anytime, anywhere.

Skype works with computers, smartphones, mobile phones, and landline phones and available for all major operating systems. It has free features such as Skype-to-Skype voice and video calling, instant messaging, file transfer, presence, screen sharing, multiparty voice calling and multiparty IM, along with paid features such as outgoing calls to the PSTN, outgoing SMS, incoming calls from the PSTN, Skype Wi-Fi, multiparty video calling and screen sharing.

Skype aims to be the global communications service provider that billions of users will choose to share their experiences. Microsoft's acquisition of Skype and integration of Skype with Microsoft products will play a pivotal role in achieving that goal. Skype has become an integrated feature of Windows 8 and Windows phone. The deep integration of an already popular VoIP and instant messaging service into Microsoft's products – in effect making Skype its default communication application – will no doubt further increase its usage. This provides a direct threat to both carriers' voice and messaging services but will also increase the overall amount of voice minutes.

Microsoft recently made some changes in Skype's network architecture; centralizing super nodes, previously consisted of servers residing in various data centres, as well as end-user computers meeting certain criteria, onto servers hosted within Microsoft data centres. Super nodes act as traffic cops, allowing Skype users to find one another and establish communications sessions. With this change, Microsoft believes it can better manage the Skype user experience while delivering new collaboration capabilities.

However, this move caused a firestorm as the press and privacy advocates expressed concerns that Microsoft could now wiretap or record Skype calls. Microsoft denies this, explaining Skype call traffic still remains point-to-point; super nodes only facilitate call connection, they are not involved in the actual data transmission between end points. Though

ill-founded, these concerns suggest that privacy and security concerns about voice calling remain important, at least in some places.

6.3.1. Company background

Niklas Zennström and Janus Friis, founders of KaZaA, along with Estonian developers Ahti Heinla, Priit Kasesalu, and Jaan Tallinn, founded Skype in 2003. The newly released VoIP software had no problems with firewalls, provided high voice quality, and, most importantly, was free of charge.

Skype's initial burst of growth came because it offered two things – free calling to other Skype users and instant messaging. Instant messaging worked well on both slow and fast networks. It was one feature that brought people back to the app every day and drove initial takeup. Subsequently, it started providing premium SkypeIn/ SkypeOut services that generated most of its revenue, as well as hardware products in cooperation with partners. Skype announced 2 billion minutes of usage in a day in April 2013.

Skype was bought by eBay in 2005 for US$3.1 billion. On 1 September 2009, it was announced that eBay was selling 65% of Skype for US$1.9 billion, valuing Skype at US$2.75 billion.

On 10 May 2011, Microsoft Corporation acquired Skype for US$8.5 billion. The company was incorporated as a division of Microsoft, and Microsoft acquired all of the company's technologies with the purchase. Prior to the acquisition in 2010, Skype had a registered customer base of 663 million and made US$860 million revenue on which it posted an operating profit of US$264 million. However, overall it made a total loss of US$7 million, and had long-term debt of US$686 million. Considering this financial performance, and the fact that it was valued at US$ 2.75 billion just two years earlier, there are views that Microsoft overpaid for Skype in current market terms. However this acquisition should also be viewed as a broader strategic move by Microsoft to reinforce its stake in the IP future of communications.

The majority of Skype usage is free peer-to-peer conversations. In addition Skype offers a premium service, SkypeOut. SkypeOut allows users willing to pay a fee to call landlines, mobile phones and smartphones. SkypeOut is most popular amongst users that frequently make international calls. Moreover, the company offers other features that users can choose to pay for. In every case, Skype is considerably cheaper than the alternative. The base of users that only use Skype's free features remains large because the company makes enough money from paying customers to keep the core features free. In 2012, only 1.4% of the total Skype consumer base was made up of paying Skype users.

Skype generates revenue both standalone and in partnership with others. Some of these initiatives generate revenue directly; others are designed to support usage and advertising revenue:

- PSTN related revenues, Wi-Fi access revenues: partnerships with almost 100 telecommunications operators for PSTN termination, partnerships with Wi-Fi access providers
- Premium services that build on free services: group video, group screen sharing, live chat and unlimited calls to selected countries.
- SME market: some forays to provide affordable rich communications solutions to small businesses
- Advertising: various models including advertising in the client, click-to-call
- Partnerships with hardware OEMs for Skype branded equipment (e.g. Panasonic, LG, Samsung, Sony, Belkin, Dell, Toshiba, Nokia, Sony, and Logitech)

- Partnerships with software and Internet players (e.g. Facebook, Yandex)
- Partnerships with MNOs (Verizon, TELUS, KDDI, Hutchison 3, Telkomsel).

A summary of Skype's partnerships is in Table 6.x.

Table 1: Examples of strategic business partnerships

Partner Company	Benefits
Hardware manufacturers	Skype partnered with hardware manufacturers like Sony, Samsung, Logitech, Panasonic, Belkin etc. to produce Skype certified webcams, headsets, microphones, homes phones, HDTV to facilitate smoother and crispier audio/video calls through Skype and enhance user experience.
Facebook	In 2011, Facebook entered in to a partnership with Skype to launch video calling feature within the social networking site.
Verizon Wireless	In 2010, Skype and Verizon declared a strategic partnership to introduce a new and easy-to-use Skype mobile offer. They launched Skype supported smartphones with data plans from Verizon wireless, one of the most reliable wireless network in America, which enabled users to make and receive unlimited Skype-to-Skype voice calls around the globe; call international phone numbers at competitive SkypeOut calling rates; send and receive instant messages to other Skype users; and remain always connected with the ability to see friends' online presence.
Comcast	In 2011, Comcast and Skype entered in to a partnership to enable Comcast customers a simple, affordable, high-quality video calling experience using existing HD television and broadband connection. Customers can make and receive Skype video calls, share in the excitement of a big game, a birthday party or holiday, a bedtime story, or a casual conversation with friends and loved ones.
Mobile network operators (KDDI, Telkomsel, Hutchison 3 etc.)	Skype formed a strategic alliance with mobile operators such as KDDI, Telkomsel, and Hutchison 3 to integrate Skype across their services. Moreover, the data usage for using Skype is not charged against the monthly data allowance, in case there is a data limit. The customers also have the Skype app always on, see friends' online presence, call international numbers at economical SkypeOut calling rates and, participate in group chats and conference calls.
Wi-Fi hot spot operator (BT openzone, Fon, M3 Connect, Tomizone etc.)	Skype entered in to a partnership program with the leading Wi-Fi hotspot providers such as BT openzone, Fon, M3 Connect, Tomizone etc. to provide access for consumer and business users' on-the-go using Skype. Skype users can connect to the Internet that uses Skype Credit (pay-as-you-go) to get online through a Wi-Fi operator partner in over 500,000 hotspots around the globe including 500 airports, 30,000 hotels and numerous cafes, trains, planes, offices buildings, and convention centres.

Source: Ovum

6.3.2. Supply chain analysis

Like Netflix, Skype's core competence is software production, and it uses Amazon and other cloud infrastructure to support its service. However, its infrastructure requirements are relatively limited. IT infrastructure is needed for login and call setup. Once the call is established, the client software operates in a peer-to-peer mode over the public Internet or IP VPN.

Software production

Since its inception, software development and continuous improvement is the prime focus for Skype. The Skype software is the company's centrepiece, and its maintenance is the core competence of the company. In recent years, a great deal of effort has been expended on improving voice codecs to improve call quality. Users can download the client software for free.

Skype's commitment to mobile devices and cross-platform accessibility is paramount. Skype continuously invest in its existing platforms - iOS, Android, Mac – by providing updates and upgrades to the product user interfaces that continue to improve user experiences. It also works with partners to continue developing products so people can extend their Skype experience to their TVs, phones and even more computers. It partnered with Comcast to bring a new HD video calling experience to the living room directly through consumers' TVs.

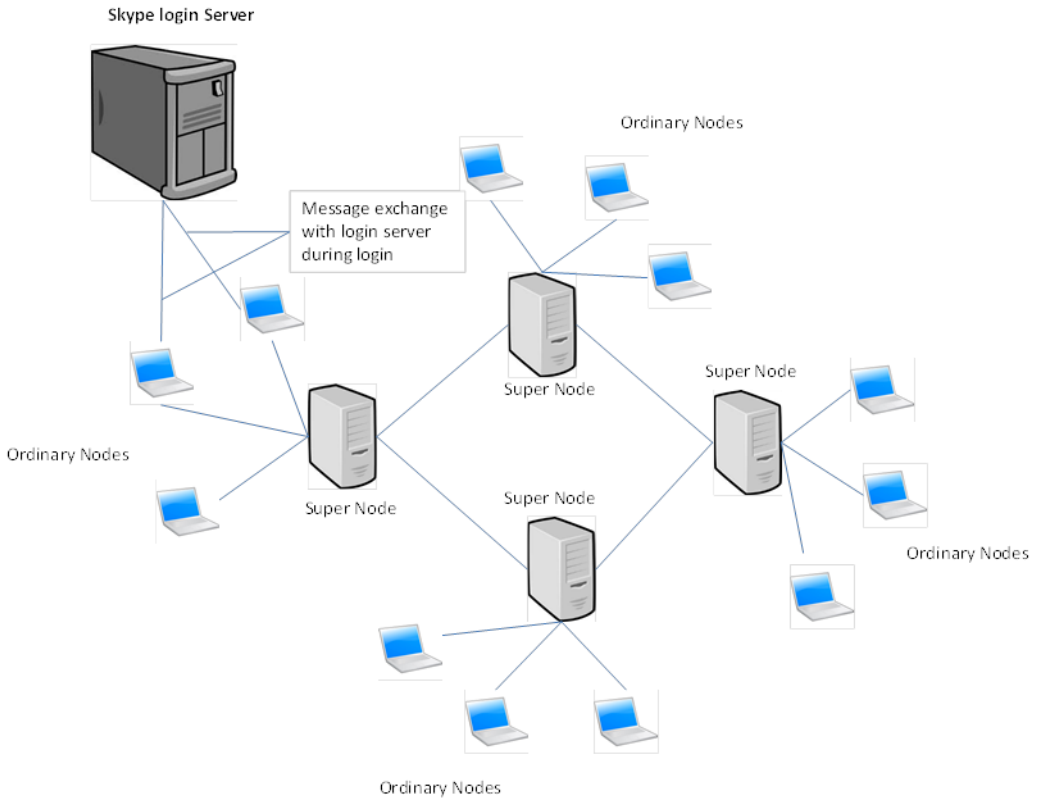
IT infrastructure and platforms

Skype was the first peer-to-peer IP telephony network, requiring minimal centralized infrastructure. The Skype user directory was decentralized and distributed among the clients, or nodes, in the network. Each client maintains a host cache with the IP address and port numbers of reachable super nodes.

Skype network contains three types of entities:

- Ordinary nodes,
- Super nodes,
- Skype login server.

Figure 6.12: Skype Network Architecture



Source: Ovum

Figure 6.12 shows logical (not physical) connections between the different components of the Skype network. The network is hierarchical. The Skype client application uses the ordinary host nodes for voice calls and text messages. In other words, ordinary nodes are just PCs, mobile phones and similar devices. Ordinary nodes are connected to each other via the super nodes and super nodes act as the end point of the ordinary host nodes. Super nodes also mediate the login procedure, which is controlled by the Skype login server. Apart from the login server, there are SkypeOut and SkypeIn servers which provide PSTN bridging.

Skype first deployed 'mega-super nodes' to the cloud to improve reliability of the Skype software and service in December 2010. These nodes were deployed in Skype's own data centres, within third-party infrastructure such as Amazon's Elastic Compute Cloud. The move was made in order to improve the Skype experience, primarily to improve the reliability of the platform and to increase the speed with which it can react to problems. The move also provided the ability to quickly introduce new features that allow for a fuller, richer communications experience.

Prior to 2011, super nodes were simply regular users who had sufficient bandwidth, processing power, and other system requirements to qualify. These super nodes then transferred data with other super nodes in a peer-to-peer fashion. But after 2011, Microsoft introduced changes in the Skype architecture by setting up 10,000 super nodes, running on Linux, that were all hosted by Microsoft on cloud infrastructure. This was to make the servers more secure. In addition to hardening them to hacks, the Microsoft-hosted boxes are able to accommodate significantly more users. Super nodes under the old system typically handled about 800 end users simultaneously, whereas, the newer ones host about 4,100 users and have a theoretical limit of as many as 100,000 users.

The central Skype login server stores usernames and passwords, and user authentication is done at this server. This server also makes sure that the user names are unique across the Skype name space. An ordinary node has to register itself with the Skype server and connect to a Super Node for a successful login.

Advertisers

Skype services enable consumers to connect with their friends, family, and colleagues for frequent, long, and engaging conversations. Here lies the opportunity for companies to make a valuable brand impression through rich and engaging ad experiences with a large and mobile Skype audience that is growing fast.

Skype offers several types of advertising services. The PC client features banner ads, both expandable and non-expandable. More controversially, it introduced in-call ads in 2013, which appear on screen during audio and video calls. The mobile client also features banner ads. These ads are served by a number of online advertising exchanges including Google Ads and DoubleClick. Skype does not provide a breakdown of its revenues, so advertising revenue is not known.

6.3.3. SWOT

Strengths

Skype has the most established brand in IP voice globally, and its integration with Microsoft reinforces this strength. Its large user base helps to entrench it as a leading peer-to-peer app, since it has the scale and critical mass needed to generate network economies.

Skype's quality of service and scalability has improved in recent years with continued improvement of voice codecs and Microsoft's investment in mega super nodes. Its association with Microsoft reinforces the software capabilities that are core to innovation and maintaining its offer.

Weaknesses

Skype has had bad publicity with security problems. In November 2010, a flaw was disclosed to Skype that showed how hackers could secretly track any user's IP address. In addition to that, in November 2012, a Russian user published a flaw in Skype's security, which allowed any person to take over a Skype account knowing only the victim's email. It was claimed that this vulnerability existed for months before publication.

In addition, Skype also records users' data about calls in a "History" file saved on the user's computer. Attackers who gain access to the client computer can obtain the file. Skype's file-transfer function does not integrate with any antivirus products, although Skype claims to have tested its product against antivirus "Shield" products. Customer registration is uncontrolled and identity is never checked. Failure to provide control or monitoring over users has resulted in conflict with government security agencies in countries where communications are closely monitored such as UAE.

Another Skype weakness is the almost non-existent customer support for free users. This provides an incentive for free users to upgrade to paying products, but it also provides telco competitors with a point of differentiation against Skype.

Opportunities

Skype's biggest opportunity is its integration into Microsoft Lync, and the consequent access to the enterprise market. This puts Skype in a very competitive position as a provider of enterprise VoIP and messaging.

The power of Skype's brand also provides Skype with an entree to all of the largest mobile device platforms (apart from Blackberry). This cross-platform position helps to entrench it as a leading VoIP and messaging provider.

Threats

Skype faces some threats in common with other VoIP providers, principally regulatory threats. VoIP applications have been, and are banned in some countries where they are regarded as a threat to telco revenues. Where they are not banned, there is the prospect of being regulated as voice providers, and being required to meet regulated standards of service such as the provision of emergency call services. Skype has been trying to avoid this as it leads to greater cost and complexity. Although Skype positions itself as an alternative technology which does not replace traditional telephony operators, it nevertheless acts very much like a telco in some respects.

Skype also faces competitive threats. Although it has the largest VoIP user base, other aggregators and application providers such as Facebook also have large customer bases, and are developing their own VoIP and messaging applications.

6.3.4. Future outlook

Microsoft is positioning Skype as the default instant messaging client for its platforms, and has released deeply-integrated clients for both Windows 8 and Windows Phone 8.The company closed down its Windows Live Messenger service in March 2013 (with the exception of China), and is encouraging users to use Skype instead. Additionally, Microsoft has launched a platform to connect small businesses, known as Skype in the Workplace. Skype has also introduced prepaid cards in the UK, allowing users who don't have a credit card or PayPal account to use SkypeOut or Skype Wi-Fi services.

New LTE and cable networks with IP have enabled faster data transmission resulting in increased demand from consumers and businesses for more unified communications with

easy switching between voice, video and messaging. Were Skype to sustain its market leadership, this will become an attractive option for certain operators. A partnership with Skype could open up a number of opportunities for mobile operators, from offering cheap international call services to driving adoption of higher-value data bundles.

Skype may find itself increasingly regulated. For example, in some countries VoIP providers already have to ensure the provision of emergency calls.

6.3.5. Impact on the market and consumer

Market

A service that looks likely to cannibalize operator voice revenues and compete for subscriber attention is in fact worthwhile for some operators to partner with. Some operators are already working with Skype through its mobile partner program. These include Hutchison 3G, Verizon, and Qtel Group, who will be looking to profit from reduced churn, more subscribers, sales of specialized data packages, possible ad revenues, and a share of "Skype-out" revenues billed directly to the phone bill.

Skype's Mobile Partner Program (MPP) for operators in markets with low 3G broadband penetration aims to bring Skype to over 100 different mobile phones, and enable mobile operators to differentiate their offerings in a competitive market environment using a simplified model that can be rolled out quickly and easily. The versions of Skype delivered through this program are optimised for efficient bandwidth usage and minimal impact on battery life and data usage. Moreover, Skype-enabled TVs are already on the market from Panasonic and Samsung, and more brands are expected, which will enable Skype to further penetrate the home.

Telco operators may launch their own VoIP services to replace their traditional circuit-switched offerings at a lower cost base to combat VOIP service providers. However, mature market telcos that have a sizeable postpaid customer base, charge mostly by data volume, or offer unlimited call and text packages have less to worry about.

Consumer

The primary focus of Skype is to make Skype available across platforms and devices in order to facilitate regular communication, regardless of the location. The existence of documented unsuccessful attempts to use Skype for emergency services shows that at least some users consider it a substitute for traditional narrowband voice services. As such they are likely to expect access to the emergency services and other features that are not currently implemented on Skype platforms. At the same time, many consumers are using Skype in work and personal contexts in new and complementary ways.

7 Attachment: Cloud services in Australia

The market for cloud IT infrastructure and platforms in Australia has grown rapidly over the past five years. There are now several hundred companies claiming to offer cloud services across a wide range of service categories.

For most of these organisations cloud services are an evolution of earlier forms of outsourced ICT provision, such as website hosting and managed services for telecoms, computing workloads, data storage & backup and applications. Indeed there is often some degree of ambiguity around the degree to which services are really 'cloud' or not. This sometimes leads to accusation of "cloud washing", where services are described as cloud services for marketing purposes but are in reality traditional managed services, with up-front payment for dedicated resources and long term contracts.

The practical perspective, however, is that some IT services companies are still in the process of building out their cloud services technologies, operational processes, usage-based billing systems and skill sets in response to the growth of market demand. It is also the case that demand for cloud services is still maturing, so that customer preferences oblige most IT services companies to provide a range of service models irrespective of any pure definition of cloud services. The market is still maturing.

7.1 AWS – cloud services exemplar

The clearest exemplar of Infrastructure-as-a-service (IaaS) is Amazon Web Services (AWS) – which was the first company to launch a public cloud IaaS offering and remains the global leader in this category. AWS established an availability region in Sydney in 2012, with two availability zones for redundancy, so it is also a good example of a global cloud services provider combining the benefits of both global scale and local operational presence. Australian companies can choose to run their applications on AWS with the data residing entirely in the Sydney availability region – and accessed over private telecommunications links if desired. This blurs the boundaries between so-called 'public' and 'private' cloud services – AWS is a public cloud provider that also provides dedicated resourced and secure network access.

AWS also provides a range of Platform-as-a-Service (PaaS) capabilities to provide an environment in which applications can be built and run – using both customised programming and assembly of pre-existing web services components and applications.

The AWS service catalogue includes one of the most complete range of web services of any vendor and defines the 'state-of-the-art' of IaaS and PaaS. AWS services include:

- Networking
    - Virtual Private Cloud: enables users to provision a logically isolated section of the AWS cloud so that AWS resources can be launched in virtual network that is defined by the user.
    - Route 53: a highly availability, scalable, Domain Name System (DNS) web service.
    - Direct Connect: enables the user to establish a dedicated network connection from their premise to the AWS cloud.
- Computing

  - Elastic Compute Cloud (EC2): a web service that provides resizable compute capacity in the cloud.
  - Auto Scaling: enables EC2 capacity to scale up or down up or down automatically.
  - Elastic Load Balancing: automatically distributes incoming application traffic across multiple Amazon EC2 instances.
  - Elastic MapReduce: a web service that enables businesses, researchers, data analysts, and developers to easily and cost-effectively process vast amounts of data.
- Storage
  - S3: a web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web.
  - Glacier: a low-cost storage service that provides secure and durable storage for data archiving and backup.
  - Elastic Block Store (EBS): provides block level storage volumes for use with Amazon EC2 instances.
  - AWS Import/Export: accelerates moving large amounts of data into and out of AWS using portable storage devices for transport.
  - AWS Storage Gateway: a service connecting an on-premises software appliance with cloud-based storage to provide seamless and secure integration between an organization's on-premises IT environment and AWS's storage infrastructure.
  - CloudFront: a web service for content delivery.
- Database
  - Relational Database Service (RDS): is a web service to set up, operate, and scale a relational database in the cloud.
  - DynamoDB: is a fast, fully managed NoSQL database service to store and retrieve data, and serve any level of request traffic.
  - ElastiCache: is a web service to deploy, operate, and scale an in-memory cache in the cloud.
  - Redshift: a fast, fully managed, petabyte-scale data warehouse service to analyse data using a user's existing business intelligence tools.
- Application Services
  - CloudSearch: a fully-managed search service in the AWS Cloud that allows customers to easily integrate fast and highly scalable search functionality into their applications.
  - Simple Workflow Service (SWF): is a workflow service for building scalable, resilient applications.
  - Simple Queue Service (SQS): offers a hosted queue for storing messages as they travel between computers.
  - Simple Email Service (SES): a bulk and transactional email-sending service for businesses and developers.

  - Simple Notification Service (SNS): a web service to set up, operate, and send notifications from the cloud.
  - Flexible Payments Service (FPS): a payments service to enable users to accept payments on their website for selling goods or services, raise donations, execute recurring payments, and send payments.
  - Elastic Transcoder: a video transcoding web service to convert (or "transcode") video files from their source format into versions that will playback on devices like smartphones, tablets and PCs.
- Access and Management
  - AWS Management Console: enables users to access and manage AWS web services through a web-based user interface, also features a mobile app for Android.
  - AWS Identity and Access Management (IAM): enables users to securely control access to AWS services and resources – with identity federation between a user's corporate directory and AWS services.
  - CloudWatch: monitors AWS resources such as EC2 and RDS DB instances as well as custom metrics generated by a customer's applications and services.
  - Elastic Beanstalk: automatically handles the deployment details for a new AWS service – such as capacity provisioning, load balancing, auto-scaling, and application health monitoring.
  - CloudFormation: gives developers and systems administrators an easy way to create and manage a collection of related AWS resources, provisioning and updating them from templates in an orderly and predictable fashion.
  - Data Pipeline: a web service that helps users to process and move data between different AWS compute and storage services as well as on-premise data sources at specified intervals.
  - OpsWorks: a DevOps solution for managing applications on the AWS cloud – featuring an integrated experience for managing the complete application lifecycle, including resource provisioning, configuration management, application deployment, software updates, monitoring, and access control.
  - CloudHSM: a service that helps users to meet corporate, contractual and regulatory compliance requirements for data security by using dedicated Hardware Security Module (HSM) appliances within the AWS cloud.
- AWS MarketPlace
  - MarketPlace is an application store which comprises a wide range of applications from independent application providers – include major ICT companies such as Oracle and SAP.

7.1.1. AWS Cloud services benefits

AWS uses the schematic in Figure 7.1 to illustrate the key service benefits of the cloud services model as distinct from a 'private cloud' built and operated by an in-house IT department.

Figure 7.1: AWS Cloud Services vs. In-house Private Cloud

	Pay as you Go	Lower Overall Costs	Stop Guessing Capacity	Agility / Speed / Innovation	Avoid Undifferentiated Heavy Lifting	Go Global in Minutes
amazon web services	✔	✔	✔	✔	✔	✔
"Private" Cloud	X	X	X	X	X	X

Source: Amazon Web Services

Cloud services turn computing activities into flexible utility services that can be consumed on-demand and paid for on a usage basis. One of the enablers of this model is the fact that the services are provided in a modular fashion as web services with transparent application program interfaces (APIs). Amazon executives sometimes refer to AWS as an 'API business' to make this point. The APIs are the secret to the explosive growth of cloud services because they enable customers to consume cloud services, passing data back and forth and integrating to other applications, without needing to know the full technical detail of how they work 'under the hood'. APIs also enable the creation of large ecosystems of cloud providers and independent software vendors that are able to interoperate to deliver a seamless customer experience.

Amazon Web Services has, to a large extent, defined the terms IaaS and PaaS and continues to set the pace of innovation in cloud services. It is useful to use AWS as the clearest illustration of what makes cloud services different to other ways of delivering and sourcing ICT capabilities.

7.2 The Australian Cloud Services Landscape

Many other companies, both global and Australian, provide variations on these IaaS and PaaS offerings in the Australian market. This section lists the leading providers known to be actively operating in Australia.

7.2.1. Global IT Services Companies

Most of the leading ICT services organisations have establish IaaS offerings to complement their more traditional managed services and outsourcing offerings. Many now have data centres located in Australia offering a wide range of cloud services. These services are focused primarily on the enterprise market. Vendors known to be actively providing IaaS services in Australia include:

CSC	Datacom	Dell
Fujitsu	HCL	Hitachi Data Systems
HP	IBM	Microsoft Azure
NEC	Oracle	Wipro

In practice, these vendors primarily target the larger end of the enterprise and government markets. For example Datacom Cloud Services and IBM SmartCloud Enterprise services.

7.2.2. Global Cloud Services Providers:

It is in the nature of Internet delivered cloud services that they are ubiquitously available throughout the world from any location. There are thus thousands of companies large and small that could provide cloud services in the Australian market from overseas locations. Some of the noteworthy IaaS or PaaS vendors, however, include: GoGrid, Google and Rackspace. Rackspace, in particular, is a global leader in the IaaS business and has recently established a data centre in Sydney.

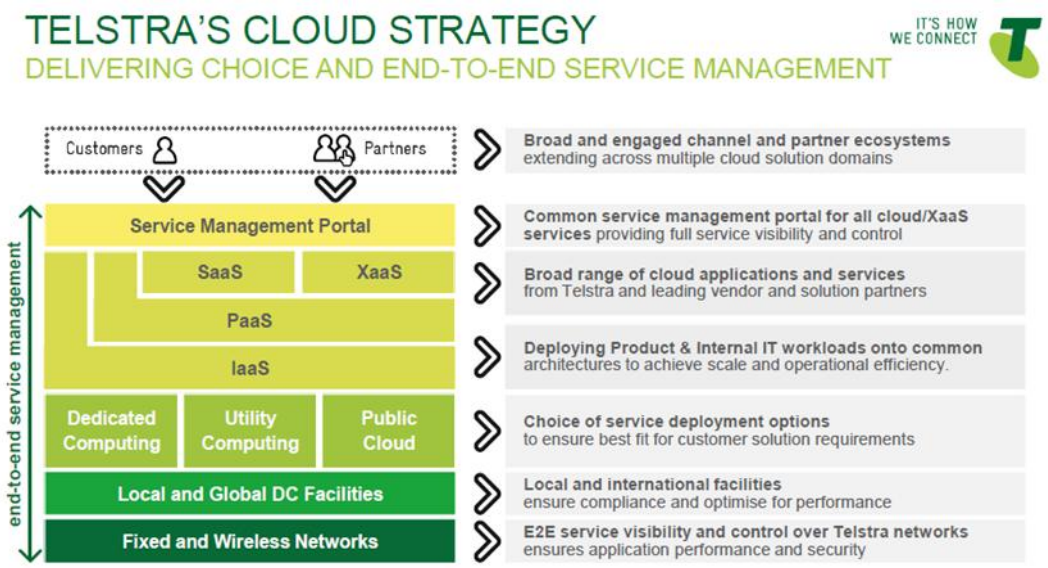
7.2.3. Telecoms Companies

Cloud services are a logical extension of the telecommunications network, and telecoms companies have been at the forefront of the development of large-scale cloud services in the Australian market. Most telcos have been offering a range of managed telecoms services to large and small business customers for many years, and have extensive network and data centre infrastructure located throughout the country. The leading Australian-based telco companies offering IaaS include:

AAPT	AmComm	Macquarie Telecom
Macquarie Telecom Ninefold	Optus	Telstra
Telstra T-Suite		

For example, Telstra has an $800 million investment program underway to build out cloud services capabilities targeting the Australian enterprise and government market. Figure 7.2 summarises the key elements of the strategy.

Figure 7.2: Telstra's Cloud Strategy



Source: Telstra

In addition, Telstra's T-Suite offering targets the SMB market with a range of cloud services – primarily acting as an online store for SaaS solutions.

Macquarie Telecom's Ninefold is a good example of a telco having established a free-standing business to provide IaaS to the SMB sector (while its parent company focuses on the enterprise and government market). Ninefold is a 'pure cloud' IaaS business which is growing steadily and now has operations in Australia and the United States.

Other global telcos such as Alcatel Lucent, BT and Verizon also offer services in the Australian market place – most typically to clients which they have international relationships with.

7.2.4. Australian ICT Services Companies

As discussed above, most local ICT services companies have had to respond to competitive pressures and customer demand to add cloud services to their existing managed services and outsourcing offerings. The leading Australian-based ICT services companies offering IaaS include:

Aptira	Area9	BrennanIT
Bulletproof Networks	Conexim	Data#3
Datacom	Dimension Data	EDC
Fluccs	Harbour IT	Interactive
Interhost	Melbourne IT	OBT
PacNet	Uberglobal	UltraServe
UXC Connect		

Services offered typically span the full range of website and application hosting, managed services, co-location, network services, software development, and systems integration and consulting services. IaaS is most typically provided by these companies on a private and hybrid cloud basis – blurring the distinction between 'in-house' and 'outsourced' ICT capabilities in response to the requirements of enterprise and SMB clients. For example, Figure 7.3 illustrates the positioning of Fluccs' IaaS offering, Fluccs Elastic, which can be provided in a range of variations to suit customer requirements for pay-as-you-go (PAYG) or dedicated, private, cloud services.

Figure 7.3: IaaS Features offered by Fluccs Elastic

Features	Monthly Cloud	PAYG Cloud	Hybrid Cloud	Private Cloud
Create, start, stop, reboot virtual machines	✓	✓	✓	✓
Reinstall or change Operating System	✓	✓	✓	✓
Order additional resources at any time	✓	✓	✓	✓
Access a pool of resources		✓	✓	✓
Instantly scale resources up or down		✓	✓	✓
Schedule backups of your VM to our NAS	✓	✓	✓	✓
Restore VMs from backup	✓	✓	✓	✓
Create your own templates		✓	✓	✓
Deploy your own templates on new VMs		✓	✓	✓
Console access to your VM at any time	✓	✓	✓	✓
View CPU usage per minute and per hour	✓	✓	✓	✓
Create Private VLANs		✓	✓	✓
Segregate VMs so they are never on the same hypervisor		✓	✓	✓
Pay monthly in advance	✓		✓	✓
Pay only for what you have used		✓		
Dedicated hardware for virtual machines			✓	✓
Dedicated Storage				✓

Source: http://www.fluccselastic.com.au/

7.2.5. Australian Cloud Services Companies

The final group of vendors are those that have either founded their companies in the post-cloud-services era or have decided to make cloud services the main focus of their business. Their offerings are primarily or total based on IaaS. The leading Australian-based cloud services specialist providers include:

6YS	ASE IT	BitCloud
Cloud Central	Cloud People	Crucial Cloud Hosting
Dynomesh	Emantra	Hostworks
InfoPlex	InfraServe	LazuCloud
OrionVM	SteamEngine	SlicedTech
True Cloud Solutions	TrustedCloud	Virtual Ark
VMVault	ZettaGrid	

Emantra, for example, is regarded as one of the leading Microsoft private cloud services providers in Australia. The business has been operating since 2005, but has now largely

focused its service offerings around IaaS, PaaS and SaaS solutions utilising Microsoft hosting infrastructure and software.

SteamEngine is an example of 'pure cloud' company, with its service offerings entirely defined in terms of IaaS. In contrast, ASE IT is one example of a company that positions itself as providing "everything as a service".