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Summary for Ofcom

Digital Communications Value Chains

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Analysys Mason Limited
North West Wing, Bush House
Aldwych
London WC2B 4PJ
UK
Tel: +44 (0)20 7395 9000
london@analysysmason.com
www.analysysmason.com
Registered in England and Wales No. 5177472

Introduction

Analysys Mason was commissioned by Ofcom to undertake research into the Digital Communications Value Chain. The aim of the work is to inform Ofcom's thinking and activity in digital communications markets.

This document is a summary of our full report, which is published in parallel.

Our work followed a multi-stage process, which included:

- Developing a high level map of the digital communications value chain, with all the interlinked elements summarised in single picture.
- Documenting a comprehensive and granular view of the activities in the value chain.
- Assessments of selected markets, with findings summarised in a 'one-pager' format.
- A 'deep-dive' analysis of certain markets, which we term the strategic commercial analysis.

The remainder of this summary provides an overview of our findings from each of these stages.

A high level value chain map

As a foundation to creating a high level map of the digital communications value chain, we defined a small number of key types of roles:
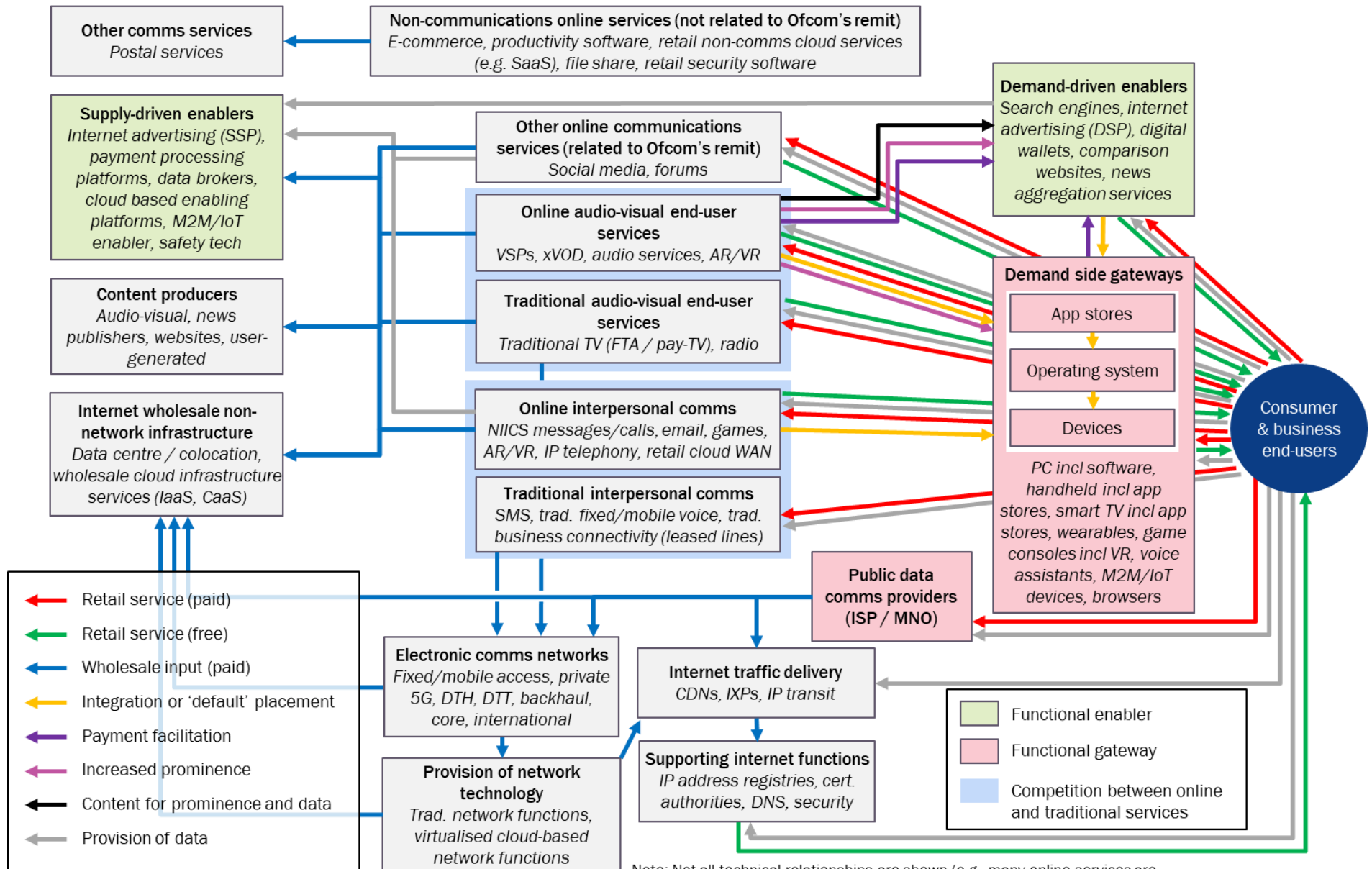
- Gateways are conduits which are necessary to deliver a service that is chosen and controlled by the end user. Gateways can be two-sided (e.g., app stores), or one-sided (e.g., devices, browsers and ISPs). Gateways are functional bottlenecks from the perspective of a firm seeking to provide a service to the end user, and often stem from a lack of multi-homing by the user.

- Demand Driven Enablers are services which are also chosen by the end-user but are ancillary or not strictly necessary to the service provision. This includes search, discovery and some forms of content aggregation and recommendations.

- Suppliers provide inputs that are chosen by the service provider and are integral to the provision of the service. Enablers and gateways also provide inputs, but these are either determined by the end user rather than the supplier or are ancillary rather than integral to the service being provided (see next).

- Supply Driven Enablers provide inputs to a service which are not strictly part of the final product, but create benefits for the service provider (e.g., wider addressable market, better sales conversion, higher-quality product). This category includes, for example, integrated payment platforms (alternative to bank transfers), supply-side platforms for digital advertising (alternative to direct sales / sponsorships).

At the end of this section we present a high level view of the communications value chain, which captures competition, commercial relationships and intermediaries. The picture presents a unified

view of the communications value chain, that tells a commercial story, building on an understanding of how technical inputs feed into the commercial relationships.

The high-level value chain map shows:

- A sensible, manageable and comprehensive split of activities in the value chain (which is used to structure the granular view in the next section).

- The dependencies and bottlenecks of Ofcom's regulated services on other sectors, and in particular highlights gatekeepers and enablers (which supports an analysis of 1- and 2-sided markets).

- The competition between traditional and online services, and the complex and multiple types of commercial relationships introduced by online services (this is shown in particular for audio-visual services).

- The complex and numerous relationships with the end user (which supports a discussion of how online players can capture a greater share of these relationships).

- Synergies and incentives for vertical integration, e.g.:

  – Many of the wholesale paid inputs can be (and are) replaced by vertical integration within large companies;

  – Demand Driven Enablers can and do strike agreements (through commercial relationships) with gateways, to make themselves less avoidable (e.g. Google as default search on iOS, or Netflix having a button on TV remotes, or pre-installed apps on mobile devices). This points to synergies from vertical integration between DDE and Gateways (e.g. Google providing search and Android OS, or the Chrome browser).

Other comms services
Postal services

Non-communications online services (not related to Ofcom's remit)
E-commerce, productivity software, retail non-comms cloud services (e.g. SaaS), file share, retail security software

Demand-driven enablers
Search engines, internet advertising (DSP), digital wallets, comparison websites, news aggregation services

Supply-driven enablers
Internet advertising (SSP), payment processing platforms, data brokers, cloud based enabling platforms, M2M/IoT enabler, safety tech

Other online communications services (related to Ofcom's remit)
Social media, forums

Online audio-visual end-user services
VSPs, xVOD, audio services, AR/VR

Demand side gateways

App stores

Operating system

Devices

PC incl software, handheld incl app stores, smart TV incl app stores, wearables, game consoles incl VR, voice assistants, M2M/IoT devices, browsers

Content producers
Audio-visual, news publishers, websites, user-generated

Traditional audio-visual end-user services
Traditional TV (FTA / pay-TV), radio

Internet wholesale non-network infrastructure
Data centre / colocation, wholesale cloud infrastructure services (IaaS, CaaS)

Online interpersonal comms
NIICS messages/calls, email, games, AR/VR, IP telephony, retail cloud WAN

Traditional interpersonal comms
SMS, trad. fixed/mobile voice, trad. business connectivity (leased lines)

Consumer & business end-users

Public data comms providers (ISP / MNO)

Legend:
- Retail service (paid)
- Retail service (free)
- Wholesale input (paid)
- Integration or 'default' placement
- Payment facilitation
- Increased prominence
- Content for prominence and data
- Provision of data

Electronic comms networks
Fixed/mobile access, private 5G, DTH, DTT, backhaul, core, international

Internet traffic delivery
CDNs, IXPs, IP transit

Provision of network technology
Trad. network functions, virtualised cloud-based network functions

Supporting internet functions
IP address registries, cert. authorities, DNS, security

- Functional enabler
- Functional gateway
- Competition between online and traditional services

Note: Not all technical relationships are shown (e.g., many online services are delivered over internet and comms infrastructure without a commercial relationship)

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A granular view of all value chain activities

We created a comprehensive mapping of the activities in the communications value chain. In total we identified 66 activities potentially in scope for analysis in the later stages of the work. We grouped the activities under a smaller number of categories, which are aligned to the high level map and are summarised in the table below. The categories are informed by the following criteria:

• A focus on traditional and online end-user comms services
• Including online end-user services that may not be communications but may be in Ofcom's remit
• Including activities which support these services (whether communications related or not)
• For illustration, we include some activities which are not in scope for further analysis

A summary of the number of activities in each category is provided in the table below.

Value chain activity categories	Activity count
Online audio-visual end-user services	6
Traditional audio-visual end-user services	2
Online interpersonal comms	7
Traditional interpersonal comms	4
Other online communications services (related to Ofcom's remit)	2
Internet service providers	1
Internet traffic delivery	3
Supporting internet functions	5
Electronic communication networks	9
Provision of network technology	2
Internet wholesale non-network infrastructure	2
Content producers	4
Supply driven enablers	6
Demand driven enablers	5
Demand side gateways	8
Sub-total of activities potentially in scope for analysis	66
Non-communications online services (not related to Ofcom's remit, non-exhaustive)	6
Other communications services	1

Further details of the full list of our activities is provided in our full report.

One-pager assessments of selected markets

Our next stage of analysis was to present a high-level assessment of selected activities in the digital communications value chain: a structured 'one-pager' for each activity. Each 'one pager' had a consistent format to capture a range of market dynamics, under four categories:

- Summary characteristics: main business model, approx. market size, market maturity and key market players

- Power balance between stakeholders: ability to exert control in the value chain, nature of relationship with end-users, and nature of wholesale relationships

- Competitive advantage, profit drivers and potential barriers to entry: role of data, role of network effects, role of scale and scope economies, and role of other differentiators

- Other market dynamics: role in disruption/substitution and role of regulation

We included the following markets in the one-pager analyses:

- Audio-visual end-user services: video-sharing (open) platforms; video on demand (VOD) services; traditional broadcast TV distribution services; holographics, augmented reality (AR) and virtual reality (VR); audio services (music, podcasts, audio books), traditional radio broadcast services.

- Interpersonal communications: number independent interpersonal communications serviced (NIICS); traditional messaging and voice/video calling services; cloud-based enterprise communications and network services.

- Other online communications services (related to Ofcom's remit): social media and online discussion forums.

- Internet service providers: public data communications providers (including fixed ISPs and data services from MNOs).

- Internet traffic delivery: content delivery networks (CDNs), including caching services.

- Supporting internet functions: certificate authorities; Domain Name System (DNS), including hosts, registrars and registries; wholesale security services.

- Electronic communications networks: mobile access networks; private cloud-based 5G networks; international networks (e.g. undersea cables).

- Provision of network technology: traditional network functions; virtualised / cloud-based network functions.

- Internet wholesale non-network infrastructure: data centres and colocation; wholesale cloud infrastructure services, including infrastructure and 'containerisation' as services (IaaS / CaaS).

- Supply-driven enablers: data brokers; cloud-based enabling platforms; machine-to-machine (M2M) and Internet of Things (IoT) application providers; safety technology.

- Demand-driven enablers: digital wallets; news aggregation services.

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- Demand-side gateways: desktop and laptop devices, including installed software; handheld devices, smart phones, and app store ecosystems; smart TV devices and streaming devices (sticks, boxes); smart home and voice assistance devices; M2M and IoT devices; browsers.

Full details of this analysis for each of the selected value chain markets are provided in the full report.

Strategic commercial analysis

Our final stage was to provide a 'deep dive' strategic commercial analysis of seven selected markets:

- Number Independent Interpersonal Communications Services (NIICS)
- Smart speakers
- Safety technology
- VOD
- Cloud for telco networks
- Connectivity services for enterprise
- Content Delivery Networks (CDNs)

For each of the markets, we again followed a similar structure of analysis, including:

- Overview of main business model(s)
- Summary of relevant parts of the value chain
- Market players, trends, metrics and shares
- Technical and business model innovations
- Relationships across the value chain
- Conclusions

Full details of the 'deep dive' analysis for each of the selected markets are provided in the full report.