

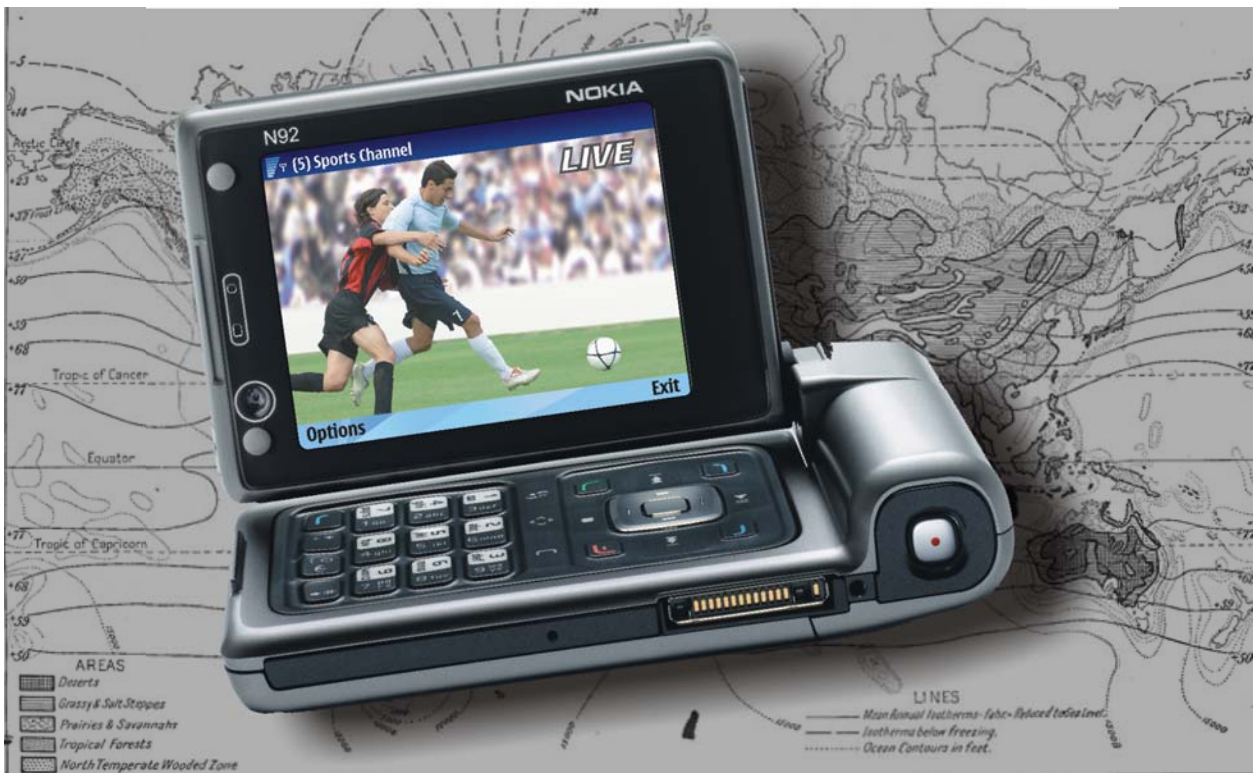


White paper

Investing in Mobile TV

How to make money from Mobile TV

Mobile TV services require a significant investment by mobile operators, broadcasters, and content providers to create profitable services. This report identifies the technology and business strategies that will be required to build profitable services in a full range of markets.



TelecomView

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White paper

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I Executive Summary

1.1 Introduction

Mobile TV is an emerging opportunity for both mobile operators and terrestrial broadcasters along with content aggregators, producers, service providers and equipment vendors, including component manufacturers. It began with 3G network operators and some 2G service providers offering streaming media including video on demand, video clips and access to broadcast content from mainstream content providers. This is initially being provided over unicast technology that is part of 3G (WCDMA and CDMA) network standards and also by services over GPRS networks. It will also be provided over mobile WiMAX networks later in 2007.

Over 100 operators have launched Mobile TV and video services over mobile networks. Solutions provide a complete Mobile TV service with a mixture of traditional broadcast, on-demand and push TV.

Early feedback from existing Mobile TV services indicates that there is a substantial market, but that compelling content is a key requirement. Studies show that consumers would be willing to pay around \$10 per month for a multi-channel Mobile TV service with unlimited usage.

Since the average time spent watching Mobile TV will be shorter than with traditional TV, fast, user-friendly channel switching is important.

Users are also starting to create and upload their own TV content through applications such as YouTube, MySpace and See Me TV.

Surveys of user preferences show that reality TV programs, such as Big Brother, as well as news and music, are what consumers want most. They also say they would be interested in having several personalized channels on their phones, and want to see credible partnerships between operators and content providers.

Consumer interest in Mobile TV is either situation or content-based. Mobile TV is a way of filling time or used for a specific reason. This could include watching a normal TV program the user would otherwise miss, or special mobile only content, or viewing live events.

Furthermore, there is an interest among consumers in interactive content, which would make Mobile TV more enjoyable.

Unicast services are offered over existing 3G-network coverage, capacity and terminals. Unicast-based services also make it possible for operators to launch an unlimited number of TV channels, and to provide interactivity through voting and content downloads. Adding multicast services increases the capacity of the network, using for example MBMS and BCMCS. This will enable an operator to cope with a higher number of users within a cell using existing spectrum resources. MBMS deployments are expected in 2008.

Using femtocells in the home could improve the business case for unicast services. A complete nodeB in the femtocell, connected to the mobile network via the fixed broadband network, reduces the Mobile TV traffic in the radio access network. This makes unicast services available to a larger audience, reduces the need for additional backhaul and improves indoor coverage and quality.

Deploying a broadcast overlay, using for example DVB or MediaFLO technology, will require new infrastructure and spectrum resources as well as new user devices, but will offer a much higher capacity on popular channels. Traditional broadcasters, content aggregators or mobile operators could provide these services.

Expanding the market for Mobile TV means building on users' attitudes towards traditional TV and mobile-phone use. Mobile TV has a competitive edge over fixed TV because it allows easier delivery of personalized, interactive and on-demand content. This potentially gives mobile operators a significant competitive advantage over traditional broadcasters.

More network capacity will be needed if and when Mobile TV becomes a true mass-market service. Standards for further enhancements of unicast, multicast and broadcast technologies for CDMA, EDGE, WiMAX and WCDMA will be needed, possibly provided by long-term evolution of 3G networks.

1.2 Global Regulation

Mobile network operators already have spectrum which can be used for unicast and multicast services. Their licenses have time limits and coverage targets, which will affect network deployment timescales. For them, or any other service provider, to launch broadcast services to mobile devices will require additional spectrum to be licensed, apart from special cases where the spectrum is license exempt. For the most part, spectrum is preferred in the VHF and UHF bands for maximum coverage at minimum cost. Unfortunately, apart from a few countries, this spectrum is used for analog TV transmissions and will continue to be used until digital terrestrial TV takes over fully, allowing the analog service to be discontinued and the spectrum to be put to other uses. The timescale for this varies from country to country, as shown in Table I-1.

Table I-1: Analog TV Switch off

Country	Analog TV Switch off
Australia	Complete 2009
Belgium	Complete 2006
Brazil	Complete 2016
Finland	Complete 2007
France	Complete 2010
Germany	Complete 2010
Italy	Commence 2006
Japan	Complete 2012
Netherlands	Complete 2006
Norway	Complete 2009
Sweden	Complete 2007
European Union	Complete 2012
UK	Complete 2012
USA	Complete 2009

Source: TelecomView, 2007

Where there is a high penetration of cable TV, analog switch-off is happening sooner rather than later. In most countries the process is a gradual one, region by region. For example parts of Germany began turning off analog TV broadcasts in 2006 and parts of the UK will start in 2008.

In Italy, Mediaset and 3 Italia have launched commercial DVB-H networks. Spectrum for the 3 Italia service was acquired by purchasing an analog TV broadcaster with UHF spectrum. In Finland, Digita was awarded a license to provide Mobile TV services using DVB-H. In Germany, Mobiles Fernsehen Deutschland (MFD) rolled out a commercial T-DMB network (the first in Europe) on the eve of the 2006 World Cup. British Telecom has also deployed a commercial Mobile TV network that uses DAB-IP, a technology related to T-DMB, using existing DAB spectrum.

In conclusion, the situation varies from country to country and in general any available spectrum for Mobile TV broadcast services could also be used for other applications. Where the regulator takes a technology-neutral stance there is no guarantee that spectrum will be secured for Mobile TV services, as other uses may have better prospects, for example WiMAX broadband wireless services.

1.3 Mobile TV Technologies

Several standards are available, supported by different vested interests for Mobile TV. These fall into three categories: unicast, multicast and broadcast, as shown in Table I-2.

Table I-2: Mobile TV Technologies

Standard	Service Type	Deployments
WCDMA (HSDPA)	Unicast	Over 100 operators
CDMA (EV-DO)	Unicast	Over 50 operators
WiMAX	Unicast	Sprint in the U.S. to deploy in 2007
MBMS	Multicast	Trials, services in 2007
CDMA Rev A (BCMCS)	Multicast	Trials, services in 2007
TDtv (version of MBMS)	Multicast	Trials, services in 2007
T-DMB	Broadcast	Korea, terrestrial service
S-DMB	Satellite	Korea, satellite service
DVB-H	Broadcast	Trials, services in 2006 and 2007
MediaFLO	Broadcast	Trials, services in 2007
ISDB-T	Broadcast	Japan, terrestrial
DVB-H+	Satellite	L-Band version of DVB-H
IDBS	Broadcast	Japan, in service
StiMi	Broadcast	China trials

Source: TelecomView, 2007

In addition Huawei has deployed a proprietary multicast technology in Hong Kong with PCCW, based on BCMCS and Samsung recently announced another proprietary technology (A-VSB), which is in trial in North America.

1.4 Market Strategies

The various approaches for launching a Mobile TV service are summarized in Table I-3.

Table I-3: Mobile TV Services

Approach	Example
Mobile operator with a 3G (or in some cases a 2G) network	Orange unicast service, with content provided by users as well as from programme makers and TV broadcasters. In some cases programming may be provided by a content aggregator, e.g. MobiTV
Mobile TV broadcast network	MediaFLO USA, BT Movio, Mediaset, Hiwire, Modeo, MFD
Mobile operator with Mobile TV broadcast overlay	TIM, KT, SKT, NTT DoCoMo, KDDI
TV broadcaster with a Mobile TV broadcast network	BSkyB (trialing MediaFLO)

Source: TelecomView, 2007

Currently the industry appears to be moving towards providing Mobile TV broadcast services from a handful of broadcasters that resell the service to mobile operators to reduce the risk associated with investing in a Mobile TV broadcast network.

1.5 Business Case Scenarios

A detailed analysis of Mobile TV technologies leads to the following conclusions:

- ❑ Mobile TV services are inexpensive to deploy using unicast 3G technology as long as they are limited to serving a small number of simultaneous users per cell site and absorb otherwise unused network capacity. Clearly, with this constraint, 3G-unicast technologies are too expensive to be used as the basis of a mass market Mobile TV service, nor were they intended for this. Multicast 3G technologies can improve the capacity by sharing radio channels amongst users watching the same programme, but is still too expensive to deploy as the basis of a mass-market service. However, for personalized Mobile TV unicast supplemented by multicast is a useful approach to increasing network capacity.
- ❑ WiMAX, particularly after multicast has been added, is a cost effective technology for deploying a mass market Mobile TV service, providing the infrastructure has been deployed also for other high-speed data applications.
- ❑ Terrestrial Mobile TV broadcast technologies such as DVB-H, MediaFLO, and DAB/DMB will provide the basis for broadcast Mobile TV services aimed at broadcasting popular TV programmes. The business case for these technologies is better at UHF and VHF frequencies but mobile operators need to consider whether to invest in their own infrastructure or to take a service from an independent Mobile TV broadcaster and share the revenue

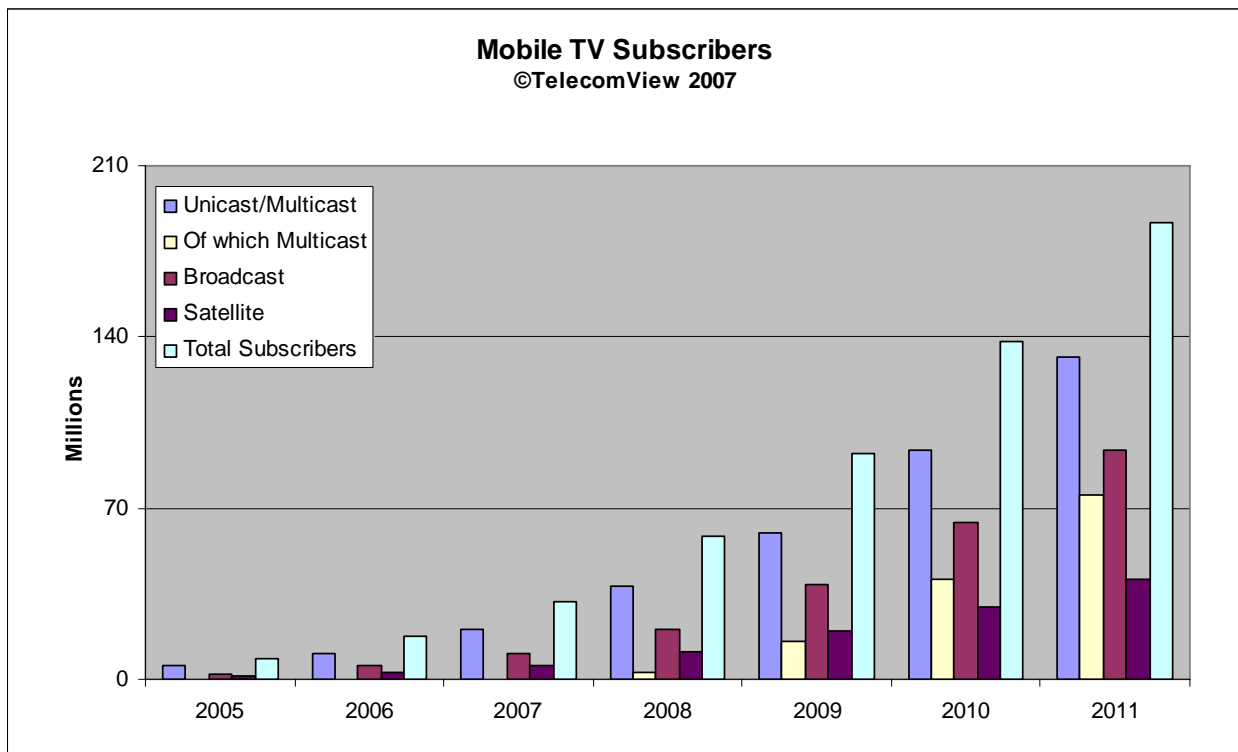
- Satellite Mobile TV is a reasonable technology choice for network operators before they can acquire UHF or VHF spectrum for a terrestrial broadcast Mobile TV service. It is also potentially useful for infill coverage and providing services across national boundaries.

1.6 Mobile TV Market Forecast

3G operators using unicast technology seeded the market for Mobile TV, with some also offering a broadcast service (in Japan, Korea, and Italy). In Germany, and recently the UK, two operators have begun services as wholesalers (MFD and BT). These will be joined by services now being deployed in North America by MediaFLO USA, Hiwire, and Modeo. MobiTV also offers its content aggregation service over 3G unicast networks in Europe and North America. Other multicast and broadcast services will be launched in the next few years leading to a complex picture of different approaches, depending on the resources and opportunities available to each operator or content aggregator. Essentially each operator has to make a decision based on local conditions in a fairly pragmatic way to achieve the best compromise between investment risk and return.

The growth of broadcast Mobile TV subscribers is shown in Figure I-1. This compares unicast/multicast Mobile TV provided by mobile operators with Mobile TV provided by broadcast technology. Unicast will be augmented with multicast services beginning in 2008.

Figure I-1: Mobile TV Subscribers by Network



Source: TelecomView, 2007

Asia-Pacific has a head start because of the services launched in Japan and Korea in 2005 and 2006. It is likely to maintain that lead as China, and later India, develops and as Japan and Korea build on their early beginnings. Broadcast Mobile TV services will commence in North America in 2007 and services in Western Europe will develop further as spectrum from analog TV broadcasts is released for other applications, including Mobile TV broadcasting.

1.7 Conclusions & Recommendations

1.7.1 Conclusions

The market for Mobile TV is complex because it brings together traditional broadcasters, content producers and mobile operators along with a new element—that of user-generated and interactive content. These could compete with each other but each needs the other to deliver compelling content to a new audience equipped with compact mobile devices. These devices may also be used for telephony, Internet access, email, music downloads, and gaming and other “infotainment” applications, in addition to TV and video based services.

The market is also complex because it involves many technologies: 2G and 3G mobile networks, and WiMAX, as well as new Mobile TV broadcast technologies derived from digital terrestrial and satellite broadcasting.

The outlook for the market is one of new challenges as TV moves from being a diet of mass produced programming to personalized content with combinations of broadcast and unicast /multicast channels tailored to each individual consumer. TV will move from the era of channel hopping to channel creation to suit an individual's preferences. A combination of mobile and broadcast technology will be the enabler for this revolution.

1.7.2 Recommendations

3G mobile networks currently may have sufficient capacity for unicast services but as traffic from voice and other applications increases, particularly bandwidth-hungry data services, the unicast TV service will begin to suffer from blocking. Typically this will begin when around 20% of the subscribers in a cell are using Mobile TV unicast services.

There are four remedies for this:

- ❑ Introduce a multicast service into the network to carry the more popular channels. This is cost-effective as it does not require additional spectrum and can be introduced quickly and selectively into the network. This could allow up to 30% of the subscribers in a cell to continue to receive a satisfactory unicast and multicast TV service before suffering the effects of congestion.
- ❑ Deploy femtocell technology and network traffic aggregation (e.g. UNC) to take traffic from Mobile TV in the home away from the radio access network. This will enable unicast services to be used by many more subscribers without reducing the base station capacity for other services.

- Offer a broadcast service on top of the unicast/multicast service. There are likely to be several Mobile TV broadcasters offering these using a variety of technologies in each market. The decision will depend on handset choice, content packaging and revenue sharing arrangements. Where the content provider sells directly to the consumer, and uses the operator's network to deliver the service, an "off portal" service, is likely to be more successful because it can offer many more programs, created by independent service providers, and not constrained by an operator's own processes and resources. The alternative to this is to invest in a wholly owned Mobile TV broadcast network, as 3 Italia has done, but the conditions for this have to be profitable.

Mobile TV services may be charged at a flat rate monthly subscription, as is common with broadcast services, or may be charged on a pay per view basis. Both charging methods are appropriate, one for general interest channels and the other for more specialized content.

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All of the charts that are included in the report are also included in the spreadsheet Annex that accompanies this report. In addition there are a number of charts that are not included in the report but that may provide additional clarity to this market.

The Annex includes the following worksheets:

Global Charts

Global Tables

Asia-Pacific Charts

Country forecasts for Australia, China, India, Japan, Korea and Taiwan.

Asia-Pacific Tables

Country forecasts for Australia, China, India, Japan, Korea and Taiwan.

Western-Europe Charts

Country forecasts for, France, Germany, Italy, Spain and the UK.

Western Europe Tables

Country forecasts for, France, Germany, Italy, Spain and the UK.

North America Charts

Country forecasts for Canada and the USA.

North America Tables

Country forecasts for Canada and the USA

ROW Charts

Regional forecasts for Eastern Europe, Latin America and Middle East & Africa

ROW Tables

Business Case Assumptions

Business Case Charts

3 Appendix I: Companies in this Report

The following companies were consulted or profiled for this report.

Table 3-1: Companies Consulted for this Report

Name	Type	Mobile Operator	Broadcast Operator	Content Provider	Infrastructure Company	Handset Company	Component Company	Software Company	Consultant
3Vision	UK-based content consultancy								X
3 Italia	Mobile operator in Italy with DVB-H network	X	X						
Alcatel	Global mobile system company				X				
Arqiva	UK broadcast network builder		X						
Cingular	U.S. mobile operator	X							
CIPA	Chartered Institute of Patent Attorneys								X
DiBcom	Semiconductor company						X		
Ericsson	Global mobile system company				X	X			
Eutelsat	European communication satellite company		X						
Harris	Video system company				X				
Hiwire	U.S. Mobile TV broadcast network		X						
IPWireless	Wireless systems vendor						X		
KDDI au	Japanese mobile operator	X							
Korea Telecom	Korean mobile operator	X							
LogicaCMG	Mobile IT services provider								X
Mblox	Software for mobile networks							X	
MediaFLO USA	Mobile TV broadcast network operator		X						
Mediaset	DVBH terrestrial broadcaster		X						
MFD	German Mobile TV broadcast network		X						
Mobidia	Software for improving transmission quality.							X	
MobiTV	Mobile content provider			X					
Motorola	Global mobile system company				X	X			
Nokia	Global mobile system company				X				
Nortel	Global mobile system company				X				
NTT DoCoMo	Japanese mobile operator	X							



Investing in Mobile TV

Name	Type	Mobile Operator	Broadcast Operator	Content Provider	Infrastructure Company	Handset Company	Component Company	Software Company	Consultant
O2	European mobile service provider	X							
Orange	European mobile service provider	X							
PCCW	Hong Kong mobile service provider.	X							
Qualcomm	MediaFLO Mobile systems company		X				X		
RAI	Italian broadcaster		X						
SKTelecom	Korean mobile operator	X							
Snell & Wilcox	Video enhancement software							X	
Sprint	U.S. mobile operator	X							
Thomson	Video system company				X				
TIM	Mobile operator in Italy	X							
T-Mobile	Global mobile service provider	X							
UDCast	Software for multimedia networks							X	
Vodafone	Global mobile service provider	X							

Source: TelecomView

4 Appendix II: Glossary

The following terms and organizations have been referred to in the text.

Acronym	Definition
3	3G mobile operator which is part of Hutchison Whampoa of Hong Kong
1x EV-DO	1 x Evolution Data Optimized
1xRTT	1 x Radio Transmission Technology
2G	Second generation mobile technology-GSM, CDMA2000
3G	Third generation mobile technology
3GPP	Third Generation Partnership Project
3GPP2	Third Generation Partnership Project 2
4G	Fourth generation mobile technology
AAA	Authentication, Authorization and Accounting
ABC	American Broadcasting Company
API	Application Program Interface
ARPU	Average Revenue per User (Usually monthly)
ATCA	Advanced Telecom Computing Architecture
ATIS	Alliance for Telecommunications Industry Solutions
ATV	Asia Television Limited
BCMCS	Broadcast Multicast Service
Billion	1,000,000,000 (1,000 Million)
Bluetooth	Unlicensed wireless technology
BSC	Base station Controller
BT	British Telecom
CAPEX	Capital Expenditure
CDMA	Code Division Multiple Access (A cellular technology)
CDMA	Code Division Multiple Access
Centrex	Centralized Exchange (Remote PBX working)
CNBC	Consumer News and Business Channel
CNN	Cable News Network
CNO	Cable Network Operator (See also MSO)
CPE	Customer Premise Equipment
CPGA	Cost per gross add
CSCF	Call Session Control Function
CTP	Cordless Telephony Profile
DAB	Digital Audio Broadcasting
DAB-IP	Digital Audio Broadcasting-Internet Protocol
DMB	Digital Multimedia Broadcasting
DS3	NA transmission standard for wideband communications
DSL	Digital Subscriber Line
DVB	Digital Video Broadcast
DVB-H	Digital Video Broadcast-Handheld
DVB-T	Digital Video Broadcast Terrestrial



Acronym	Definition
EBU	European Broadcasting Union
EDGE	Enhanced Data Rates for GSM Evolution
ESPN	Entertainment and Sports Programming Network
ETSI	European Telecommunications Standards Institute
EU	European Union
EU	European Union
EV-DO	Evolution Data Optimized
Evolved EDGE	Improved variant of EDGE
FA	Football Association
FCC	Federal Communications Commission
FCC	Federal Communications Commission
FDD	Frequency Division Duplex
FLO	MediaFLO
FMC	Fixed Mobile Convergence
FMCA	Fixed Mobile Convergence Alliance
FNO	Fixed Network Operator
GAN	Generic Access Node
GANC	Generic Access Node Controller
GHz	Giga Hertz
GPRS	General Packet Radio System
GPS	Global Positioning System
GSM	Global System for Mobility (a cellular technology)
HBO	Home Box Office
HD	High Definition
HLR	Home Location Register
HSDPA	High Speed Downlink Packet Access (See 3G)
HSDPA	High Speed Packet Download
HSUPA	High Speed Packet Upload
Hz	Hertz
IEEE802.11	Wi-Fi unlicensed wireless LAN technology
IEEE802.16	WiMAX broadband wireless technology
IETF	Internet Engineering Task Force
IMS	IP Multimedia Subsystem
INO	Integrated Network Operator
IP	Internet Protocol
IP v 6	IP version 6
IP/MPLS	IP/ Multi Protocol Label Switching
IPDC	Internet Protocol Data Casting
ISDB	Integrated Services Digital Broadcasting
ISDB-S	Integrated Services Digital Broadcasting Satellite
ISDB-T	Integrated Services Digital Broadcasting Terrestrial
ISP	Internet Service Provider
ITN	Independent Television News
ITU	International Telecommunications Union
kbps	Kilo bits per second
KDDI	Japanese Mobile Operator



Acronym	Definition
kHz	Kilo Hertz
km	Kilometer
kW	Kilowatt
LG	Lucky Goldstar
LLU	Local Loop Unbundling
LTE	Long Term Evolution (3GPP Standard)
MBMS	Multimedia Broadcast Multicast Service
Mbps	Mega bits per second
MEF	Mobile Entertainment Forum
MFD	Mobiles Fernsehen Deutschland
MHz	Mega Hertz
Million	1,000,000
MMS	Multi Media Messaging
MNO	Mobile Network Operator
MPEG	Moving Picture Experts Group
MSC	Mobile Switching Centre
MSNBC	Microsoft NBC network
MSO	Multimedia Services Operator (See also CNO)
MTV	Music Television
MVNO	Mobile Virtual Network Operator
NGN	Next Generation Networks
NPV	Net Present Value
NRA	National Regulatory Authority
NTT	Nippon Telegraph and Telephone Corporation
NTTDoCoMo	Japanese mobile operator
O2	Mobile operator owned by Telefonica
OMA	Open Mobile Alliance
OPEX	Operating Expenditure
OSA	Open System Architecture
PATS	Publicly Available Telephone Service
PBX	Private Branch Exchange
PCCW	Pacific Century CyberWorks Limited
PDA	Personal Digital Assistant
PoC	Push to Talk over Cellular
PRD	Product Requirements Definition
PSTN	Public Switched Telephone Network
PTT	See PoC
QoS	Quality of Service
QVGA	Quarter Video Graphics Array
RAI	Radiotelevisione Italiani
RAN	Radi Access Network
RTE	Radio Telefís Éireann
SCCAN	Seamless Converged Communication Across Networks
S-DMB	Satellite Digital Multimedia Broadcasting
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol



Acronym	Definition
SK Telecom	Korean mobile operator
SMS	Short Message Service
SS7	Signaling System 7
TDD	Time Division Duplex
TDM	Time Division Multiplex
T-DMB	Terrestrial Digital Multimedia Broadcasting
TDtv	TDD variant of MBMS
TIM	Telecom Italia Mobile
TISPAN	See ETSI
T-Mobile	German Mobile Operator
TV	Television
UHF	Ultra High Frequency
UK	United Kingdom
UMA	Unlicensed Mobile Access
UMTS	Universal Mobile Telecommunications System
UNC	UMA Controller
US	United States
VCR	Video Cassette Recorder
VHF	Very High Frequency
VoD	Video on Demand
VoIP	Voice over IP
VoIP	Voice over Internet Protocol
WACC	Weighted Average Cost of Capital
WAN	Wide Area Network
WCDMA	Wideband Code Division Multiple Access
Wi-Fi	Wireless Fidelity (See IEEE802.11)
WiMAX	Worldwide Interoperability for Microwave Access (See IEEE802.16)
WLAN	Wireless LAN
ZDF	Zweites Deutsches Fernsehen