

Bringing Mobile Multimedia to Best-In-Class Smartphones

Addressing end user demand for high-quality mobile TV

Current approaches to the delivery of mobile multimedia do not address mobile network provider requirements for service launch, spectrum efficiency, performance, and monetization. To properly meet end user demand for anywhere, anytime, any device communications and entertainment, and enable collaboration with application and content providers (ACPs) on the delivery of multimedia services, mobile network providers must shift from a network-centric business model to a service-centric business model supported by a High Leverage Network™ (HLN). A HLN, however, is only part of an effective mobile TV service equation. To meet quality, flexibility, and scalability requirements, mobile network providers need an integrated, encoding agnostic solution optimized for video service delivery to smartphones.

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Smartphones Have Transformed Mobile Multimedia

The year 2007 was a watershed year for the mobile communications industry. For years mobile network providers had tried to convince end users that they could provide value over mobile networks beyond basic voice, Short Messaging Service (SMS) and instant messaging. But fulfilling that promise was difficult because even though the networks could deliver advanced multimedia services, the devices themselves didn't have the capability to support them. Then everything changed — the promise of advanced multimedia services in the palm of your hand suddenly became a reality with the introduction of the iPhone by Apple®.

That single product launch made end users and everyone in the mobile communications industry take notice. Within months, other manufacturers launched their own advanced smartphones and today there are more than 100 smartphone models available from major manufacturers, including Nokia, LG, Research In Motion (RIM), and Palm. All manufacturers offer a variety of models and report brisk sales for each model. In fact, the market is so robust that industry analysts are predicting continued growth for years to come.

In a June 2009 report, for example, Ovum predicted that smartphone shipments would grow by 23 percent between 2008 and 2009, despite an overall decline in mobile phone sales. The report went on to predict that this growth would continue at a 19.5 percent Compound Annual Growth Rate (CAGR) until 2014, at which point smartphone shipments will reach 406.7 million and account for 29 percent of the total worldwide mobile handset market.¹

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The reason for this expected growth is that all industry players have accepted the idea that a mobile phone that can also act like a computer is not only possible, but also the gateway to a whole new world. And this has far-reaching implications for end users and mobile network providers.

For end users, the world enabled by advanced smartphones is one in which they can consolidate voice and data on a single, handheld device that can also support access to the Internet and a variety of Web-based entertainment and lifestyle applications. For mobile network providers, that world is one in which the promise of new revenue opportunities from multimedia services is suddenly feasible. The impact of these two realizations is already being felt throughout the industry.

With the availability of so much advanced hardware, end user demand for advanced applications has soared. Having been exposed to the possibilities and the potential of a single device that addresses their information, entertainment, and communications needs, end users are subscribing to advanced applications at an unprecedented rate. Device manufacturers are responding with more advanced operating systems. In turn, the more advanced operating systems are attracting application and content providers (ACPs) who see a new market opportunity in the ability to extend their Web-based offerings to mobile networks.

For ACPs, smartphones offer entry into the burgeoning market of mobile end users who are willing to pay for advanced services. They make it easier to focus development efforts for specific operating systems that can handle multimedia applications. By providing the applications and the content ACPs can capture a share of the market, but only if the quality of each multimedia application matches end user expectations for anywhere, anytime, any device communications and entertainment. This is especially true with mobile TV applications.

¹ "Smartphones: The Silver Lining of the Declining Handset Market", Ovum, June 2009.

More than any other application, mobile TV represents the biggest challenge for ACPs and mobile network providers. Because end user expectations are based on years of cable TV and online viewing, any mobile-based TV service must provide comparable quality. To address this expectation and deliver high-quality multimedia applications, ACPs and mobile network providers must work together to ensure any offering provides the highest quality of experience (QoE) possible from the moment of introduction. This can best be accomplished with an integrated delivery solution that not only enables high-quality multimedia delivery to an audience of one, but can also scale with the same quality to an audience of many.

Multimedia is King

Although the current wave of advanced smartphones was ushered in by the introduction of the iPhone, smartphones have been around for some time. The earliest devices offered a way for business end users to replace their Personal Data Assistants (PDAs) and their cell phones with a single device that could handle voice calls and manage contacts, calendars, and task lists. But, whereas those devices were primarily targeted at business end users, today's devices have crossed the boundary between business and personal use and have become mainstream lifestyle accessories.

“While business users are more likely to use their phone just to check e-mail and voice mail, personal users are more likely to use their phone to play games, surf the Web, take pictures, and play or stream audio/video...The most satisfying smartphones offer consumer-oriented functionality: Better web browsing experience, easier multimedia playback, and a wealth of applications produce higher satisfaction.”

According to a 2009 survey conducted by CFI Group, the majority of today's smartphone end users based their purchase decision on the ability of the device to support personal applications. The survey report noted that these end users expect their devices to do more than basic voice and data:

“While business users are more likely to use their phone just to check e-mail and voice mail, personal users are more likely to use their phone to play games, surf the Web, take pictures, and play or stream audio/video...The most satisfying smartphones offer consumer-oriented functionality: Better web browsing experience, easier multimedia playback, and a wealth of applications produce higher satisfaction.”²

To address this thirst for a better mobile experience, device manufacturers are integrating advanced operating systems into their smartphones that can manage and handle a variety of communications, information, and entertainment applications. As a result, today's smartphones are equipped with QWERTY keyboards, as well as color displays, Global Positioning Systems (GPS), and high speed connection capabilities that go beyond the user experience offered by Wireless Application Protocol (WAP).

Of all applications now available to end users with these advanced operating systems, mobile multimedia represents the next major mobile service trend. As more end users switch to smartphones, and as smartphones become more like handheld computers, consumption rates for multimedia applications, especially video and TV, will continue to rise.

² “CFI Group Smartphone Satisfaction Study 2009”, CFI Group, 2009.

The Nielsen Group reports that the number of Americans watching TV and video over mobile continues to increase. In the last quarter of 2009, more than 15 million Americans reported watching some form of mobile video — a 70 percent increase compared to the same period in 2008.

For example, in the U.S. the Nielsen Group reports that the number of Americans watching TV and video over mobile continues to increase. In the second quarter of 2009, more than 15 million Americans reported watching some form of mobile video — a 70 percent increase compared to the same period in 2008 (Figure 1).

Figure 1. U.S. consumers watching TV and video over mobile

	Overall Usage Number of Users 2+ (in 000's) – Monthly Reach			
	4Q09	3Q09	4Q08	% Diff Yr to Yr
Watching TV in the home ^o	286,945	283,539	285,394	+ 0.5%
Watching Timeshifted TV ^o	90,768	85,857	74,196	+ 22.3%
Using the Internet ^{**}	190,885	190,481	161,525	+ 18.2%
Watching Video on Internet ^{**}	138,135	138,162	123,195	+ 12.1%
Using a Mobile Phone [^]	241,626	237,411	228,921	+ 5.5%
Mobile Subscribers Watching Video on a Mobile Phone [^]	17,583	15,743	11,198	+ 57.0%

Source: The Nielsen Company

In addition, these mobile end users are more than 17 millions (Figure 2). That's significant, given that the same report noted that the 138 million people watching video on the Internet spent an average of three hours and 11 minutes viewing online video.³

Figure 2. Time spent by U.S. consumers watching TV and video over mobile

	A Week in the Life Weekly Time Spent in Hours:Minutes – By Age Demographic 4Q 2009							
	K2-11	T12-17	A18-24	A25-34	A35-49	A50-64	A65+	P2+
On Traditional TV [*]	25:17	23:24	26:14	31:58	35:40	42:38	47:21	34:37
Watching Timeshifted TV [*]	1:33	1:15	1:28	2:58	2:44	2:22	1:10	2:04
Using the Internet ^{**}	0:24	1:21	3:45	5:20	6:35	4:53	2:17	3:56
Watching Video on Internet ^{**}	0:04	0:15	0:39	0:35	0:33	0:17	0:06	0:22
Mobile Subscribers Watching Video on a Mobile Phone [^]	n/a ^{^^}	0:21 ^{^^}	0:08	0:06	0:01	<0:01	n/a ^{oo}	0:04

Source: The Nielsen Company. Based on Total Population in the U.S.

Reports by mobile network providers and online video services confirm that smartphone users want

³ "Television, Internet and Mobile Usage in the U.S.: A2/M2 Three Screen Report Volume 5", Nielsen Group, Last Quarter 2009. http://blog.nielsen.com/nielsenwire/online_mobile/three-screen-report-media-consumption-and-multi-tasking-continue-to-increase/

multimedia content. In France, Orange reports that 150,000 iPhone users downloaded the Orange TV player during the first three days of its release. In Japan the mobile BeeTV service, a joint collaboration between NTT DoCoMo and Avex Group Holdings, reported that more than 550,000 subscribers signed up for the service in just six months.⁴ Meanwhile, the latest mobile data traffic studies show that the Apple iPhone's slice of worldwide smartphone traffic rose from 43 percent in October 2009 to 50 percent in November 2009.⁵

What does all this mean for mobile network providers?

Mobile TV services require much more bandwidth and a higher quality of service (QoS) than other applications and services carried over mobile networks. Therefore, as demand for mobile multimedia applications rises, mobile network providers will have to find a way to optimize the delivery of video over their networks in a flexible, scalable, and more efficient way. More importantly, TV over mobile represents a new revenue opportunity for mobile network providers. It may very well be the reason end users will pay for a high-speed mobile broadband connection.

Delivering Mobile TV

For mobile network providers delivering TV services over their networks offers another way that they can differentiate themselves from competitors and improve their bottom line. By leveraging existing 3G infrastructures and future plans for 4G network transformations, these services can create new revenue streams by opening the door to application and service collaborations with ACPs. More importantly, TV service revenue can offset declines in average revenue per user (ARPU) from voice services.

But to reap the rewards, mobile network providers must resolve a few key challenges:

- *Service launch*: Any successful service launch will be a complex undertaking that requires end-to-end expertise. To attract end users, it must also be supported by effective marketing, which can best be enabled by ensuring the service offers desirable and high profile content.
- *Spectrum efficiency*: On the network side, the service must make the most efficient use of the available radio spectrum. Therefore, it must be a radio-optimized solution that can easily scale to a broad market as demand increases.
- *Performance*: Once launched, the service must offer a high QoE to end users if it is going to continue to drive subscriber uptake, continued usage, and revenue.
- *Monetization*: To enable new revenue streams beyond initial uptake, the service must support enhanced applications, such as personalization and targeted, interactive advertising.

Current approaches to mobile TV

Unfortunately, current approaches to the delivery of mobile TV do not address these basic requirements.

The broadcast approach, which relies on the Digital Video Broadcasting (DVB) standard to deliver programs to multiple end users simultaneously, was supposed to enable a high-quality video network while coping with the load of heavy usage. But this option has proven to be expensive and the business model was unwieldy with respect to rights between content owners and the mobile network provider.

The unicast approach, which is less costly than the broadcast option, enables point-to-point com-

⁴ "Preparing for the 4G Video Tsunami", Yankee Group, November 2009.

⁵ "Apple iPhone eats up 50% share of all mobile data traffic globally", AdMob, November 2009,

http://www.appleinsider.com/articles/09/11/23/apple_iphone_eats_up_50_share_of_all_mobile_data_traffic_globally.html

munication between a single sender and a single receiver. It is typical of most current mobile video offerings over 3G networks. With unicast there are usually as many mobile TV signals on the network as there are number of viewers simultaneously watching a given program. This makes it difficult to scale the service efficiently for a high number of end users.

The continuing rise in smartphone adoption and usage, combined with rising end user interest in TV over mobile require a different approach to service delivery that addresses the mobile network provider's key challenges.

Application enablement and a High Leverage Network™

To properly meet end user demand for anywhere, anytime, any device communications and entertainment, and enable collaboration with ACPs on the delivery of those services, mobile network providers must shift from a network-centric business model to a service-centric business model. And that shift must be supported by a High Leverage Network™ (HLN) that can meet the needs of end users, as well as those of the ACPs developing and delivering the services.

A HLN is an all-IP network that provides a common, converged foundation from which mobile network providers can deliver new services, reduce time-to-market with those services, and get a faster return on investment (ROI). This fully converged network provides continuous scaling of bandwidth across multiple dimensions, from the access layer to the transport layer, at the lowest total cost of ownership (TCO). At the same time, it equips the network with built-in service and application awareness, QoS, and traffic optimization to provide the appropriate levels of intelligence within the network at the optimum cost. In addition, it offers high reliability and availability, improved security, application assurance, caching, and enhanced policy management and mediation.

The HLN is one of the cornerstones of application enablement, which allows network providers to leverage network assets and collaborate with ACPs to deliver more advanced applications, attractive content and personalized services. It makes it easier for network providers to extract additional value from the network and generate additional revenue.

To migrate to a HLN, mobile network providers must evolve their voice-optimized networks to IP to meet the growing demand for multimedia services while reducing transport costs. This transformation to all IP is not just a transport evolution issue — it encompasses Radio Access Network (RAN) evolution, backhaul and transport, and core network and service delivery.

With a converged, multi-service infrastructure mobile network providers will then be able to deliver all traffic efficiently, especially TV. Traffic optimization, service bundling and convergence will be easier, and service provisioning and interworking will be simpler and more flexible. Most importantly, a HLN is much simpler, less complex and less costly than multiple overlay networks that are optimized for a given service. Therefore, traffic is delivered to all end users at a much lower cost per transported bit.

Most importantly, a HLN allows mobile network providers to deliver a premium QoE to end users who will pay for mobile TV content delivered directly to their smartphones.

Key requirements for an integrated solution

A HLN, however, is only part of an effective mobile TV service equation. To meet quality, flexibility, and scalability requirements, mobile network providers need an integrated solution optimized for TV service delivery.

The ideal solution will be encoding agnostic and provide live and video on demand (VoD) stream-

ing directly to smartphones using Hypertext Transport Protocol (HTTP) and Real-time Streaming Protocol (RTSP). To optimize bandwidth and efficiency, the solution should support Wi-Fi® access as well as Base Station System (BSS) Multirate. This will decrease 3G network load and allow content to be adapted according to network quality parameters.

These capabilities will be enabled by advanced service functions, such as:

- *Network Adaptation Behavior Streaming (or HTTP streaming Multirate)*, which optimizes video delivery based on radio network conditions and allows the solution to adapt to degradations in the radio network to maintain delivery of a high quality video signal at all times
- *Optimization of Encoding Profile*, which dynamically encodes video streams based on network availability (Wi-Fi, 3G, LTE) and type of content (sports, movies, news) to allow the solution to deliver the highest quality of video possible for an optimal QoE

To deliver an improved video experience compared to today's offerings, the solution should enable delivery to smartphones without requiring end users to install additional software on their devices. And to improve the end user experience and the attractiveness of services, it should offer an efficient user interface to support enriched mobile multimedia applications with advanced storyboard functions.

Finally, to enable a variety of video and TV service offerings, the solution should allow ACPs to deliver content collaboratively with the network provider, or independently from the network provider, if required.

Alcatel-Lucent Smartphone TV Solution

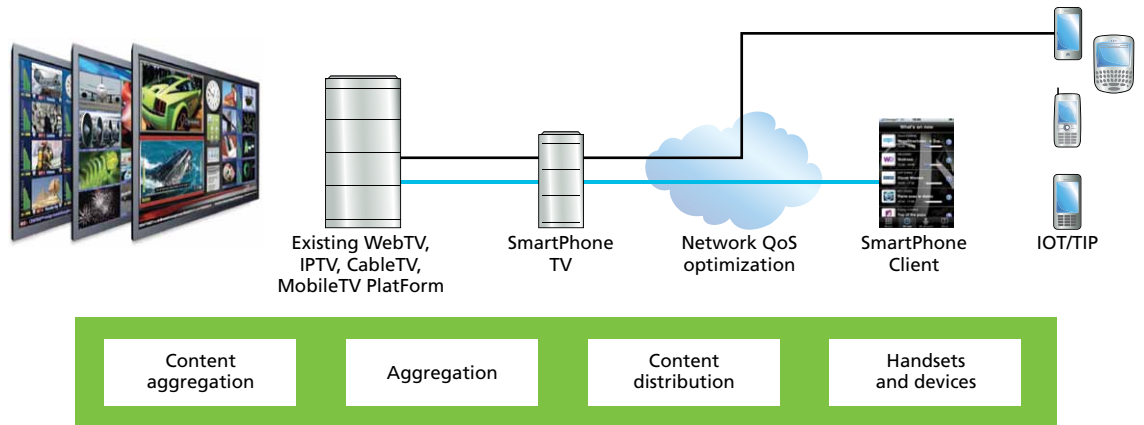
Alcatel-Lucent addresses the need for an integrated, end-to-end solution that can deliver mobile TV with the Alcatel-Lucent Smartphone TV solution. With this solution, mobile network providers and ACPs can work closely together to deliver rich multimedia content to end users over mobile networks. This compact, scalable solution is complemented by an associated set of professional services that enable the delivery of VoD, Catch-Up, Remote Personal Video Recorder (PVR), and Live TV services, as well as an Electronic Program Guide (EPG).

The Alcatel-Lucent Smartphone TV solution is based on the Alcatel-Lucent Smartphone Multimedia Server. It supports:

- HTTP and RTSP streaming over 3G and Wi-Fi
- Subscriber management and authentication
- A content management platform
- Advertising and interactivity management

The complete solution comes with an encoding module and a customized rich media client for iPhone. Future releases will extend delivery capabilities to Google Android and RIM Blackberry smartphones. In addition, the solution is designed, optimized, and available in standalone mode, and also as a complement to existing TV solutions with a smartphone Rich Media Experience (Figure 3).

Figure 3. Alcatel-Lucent SmartPhone TV solution

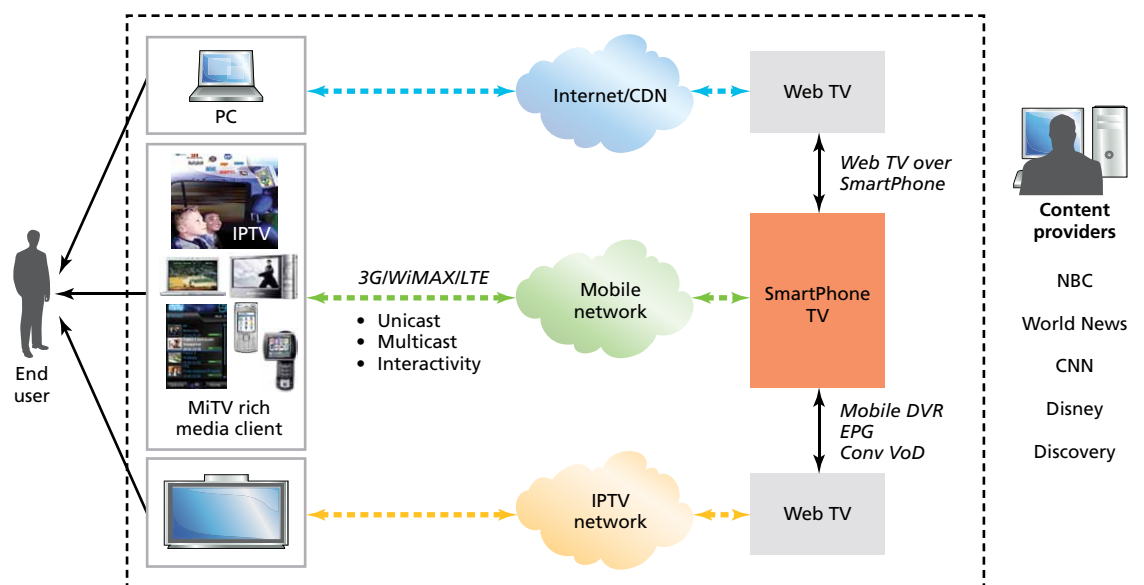


These capabilities can be adapted to scale to a variety of market requirements based on three configuration options:

- Entry level configuration for 13,500 active users (four live channels and 30 concurrent streams)
- Small market configuration for 75,000 active users (12 live channels and 148 concurrent streams)
- Medium market configuration for 180,000 active users (20 live channels and 345 concurrent streams)

Finally, to enable smooth integration into mobile networks, the Alcatel-Lucent SmartPhone TV solution is an open, encoding agnostic platform that can be easily integrated with equipment from other vendors, on top of existing mobile TV and IPTV services. This allows network providers to extend mobile TV services into multi-screen content and interactivity solutions, as required based on market conditions (Figure 4).

Figure 4. Alcatel-Lucent SmartPhone TV solution can be integrated with other equipment for a multi-screen solution



Conclusion

The incredible speed with which end users are adopting advanced smartphones has created a new market opportunity for mobile network providers.

Having been exposed to the capabilities of these advanced devices, end users have shown willingness to not only use them to manage all their personal lifestyle applications, but also to access mobile TV services. At the same time, ACPs, who are continuously on the lookout for new ways to generate revenue from their content assets, have recognized the potential for smartphones to serve as yet another screen outlet. By enabling delivery of high-quality TV over their networks that addresses the needs of smartphone end users and ACPs, mobile network providers can effectively create new revenue streams and open the door to additional video-based service options in the future.

But more than any other application, mobile TV represents the biggest challenge for ACPs and mobile network providers. Any service offering must be delivered with quality comparable to and, perhaps, superior to what end users are accustomed to getting at home over cable and online services. To meet quality, flexibility, and scalability requirements, mobile network providers need an integrated solution optimized for TV service delivery.

Based on its extensive experience with mobile video and television services, Alcatel-Lucent has developed a smartphone TV solution that addresses the needs of end users, network providers, and ACPs. The Alcatel-Lucent SmartPhone TV solution enables mobile network providers and ACPs to partner and work closely together to deliver rich multimedia content to smartphone end users. It is a complete, end-to-end solution that can be easily integrated into mobile network operations with high encoding and QoS features.

With this solution, Alcatel-Lucent makes it easier for mobile network providers and ACPs to reduce time-to-market with rich multimedia content services, extend the reach of content offerings to the growing smartphone user base, and minimize the technical and commercial risks associated with launching rich multimedia services.

Acronyms

ACP	application and content provider
ARPU	average revenue per user
BSS	Base Station System
CAGR	Compound Annual Growth Rate
DVB	Digital Video Broadcasting
EPG	Electronic Program Guide
GPS	Global Positioning System
HLN	High Leverage Network™
HTTP	Hypertext Transport Protocol
PDA	personal data assistant
PVR	personal video recorder
QoE	quality of experience
QoS	quality of service
RAN	Radio Access Network
ROI	return on investment
RTSP	Real-time Streaming Protocol
SMS	Short Messaging Service
TCO	total cost of ownership
VoD	video on demand
WAP	Wireless Application Protocol

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Yacine holds a Master of Science degree and a Master of Business Administration degree in finance and marketing from IAE Paris - Sorbonne Business School.

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