

Cable Digital News SM

Broadband Communications & Entertainment Business Insight

CDN Direct, a publication of [Cable Digital News](#), offers in-depth analysis of key broadband industry technology, infrastructure and service trends.

Beyond the Quadruple Play

Leveraging SIP and IMS to Capitalize on Cable's All-Services, All-Screens Opportunity

By Michael Harris, President & Principal Analyst, Kinetic Strategies, Inc. and Publisher, *Cable Digital News*



The cable industry is quickly adopting a "quadruple-play" strategy by committing to add mobility to today's wired bundle of video, Internet and voice services. In the U.S., cable operators Comcast, Time Warner, Cox Communications, and Bright House Networks have cemented a mobile joint venture with Sprint Nextel. Rogers Communications, Canada's largest cable operator and largest mobile provider, is working to unify its networks and service offerings. Ntl, the U.K.'s leading cable provider, is also making aggressive mobile maneuvers. Look for other operators worldwide to follow suit.

As cable races to become unwired, the market opportunity for MSOs involves more than just adding cell-phone service to the cable line-up. Cable operators are also being challenged to create a superior customer experience by delivering all three services on all three screens. Customers want an integrated, personalized blend of video, Internet, and voice services that can be accessed using TVs, PCs, and mobile devices with unmatched reliability and ease of use. More than a quad-play bundle, MSOs are facing this "three-times-three" proposition -- all three services on all three screens, enabling cable customers to access any service, on any device, anywhere, at any time.

Table 1: All Services on All Screens

	Video	Internet	Voice
TV	<ul style="list-style-type: none"> • Analog broadcast TV • Digital broadcast TV and VOD (SD + HD) • PVR and NPVR • IPTV • Gaming 	<ul style="list-style-type: none"> • Email and web messaging • Internet video • Internet audio 	<ul style="list-style-type: none"> • Voicemail, caller ID on TV • Click-to-dial
PC	<ul style="list-style-type: none"> • IPTV • Videophone • Gaming • PVR access 	<ul style="list-style-type: none"> • Email and web • Internet video • Internet audio 	<ul style="list-style-type: none"> • Voice mail, call-log access • Click-to-dial • Service management
Mobile	<ul style="list-style-type: none"> • Digital broadcast TV and VOD • Remote PVR access • Portable video content • Gaming 	<ul style="list-style-type: none"> • Email and web • Internet video • Internet audio 	<ul style="list-style-type: none"> • Dual-mode phones • Unified voice mail and call-log access • Push-to-talk • Instant messaging

Emerging multimedia communications technologies in the mobile and Internet arenas -- Session Initiation Protocol (SIP) and IP Multimedia Subsystem (IMS) -- are poised to become enablers for next-generation cable communications services, too. It remains to be seen, however, what role SIP and IMS will play in the delivery of cable's core service: subscription video. Therefore, it is wise for cable operators to investigate how SIP and IMS can best fit into their networks and service offerings, and be prepared to implement complementary technologies as needed to fully enable three-screen, three-service bundles.

In the race to merge cable and mobile services, it is certain that those cable operators with integrated, multi-service

IP backbone networks will be best positioned to make the leap into next-generation services. Comcast is blazing the trail with its Open Transport Initiative (OTI). Through OTI, Comcast is deploying a leading-edge, integrated IP optical backbone to transport all of its services -- analog and digital video, high-speed Internet, digital voice, and business communications -- across its massive 35-state U.S. footprint.

Additionally, operators that can create intuitive, unified user interfaces for their services -- enabling consistent and convenient subscriber experiences -- will gain an advantage from a customer-facing perspective. In the back office, cable operators will have the upper hand if they implement network management and operations support systems that can scale to handle multi-vendor and multi-service environments.

The New Multi-Service Operator

Historically, MSO has stood for "multiple system operator," referring to a cable television service provider that operates multiple systems. It is an antiquated term meant to define separate geographic operations and unconnected networks. Over the last decade, however, cable operators have invested billions upgrading these disparate, analog, broadcast-only systems into interactive digital networks, interconnecting them with high-capacity optical backbones while implementing cohesive network and service management solutions. Consequently, it is time to update the MSO acronym. Because today's cable companies increasingly operate single networks that deliver an array of services, the acronym more appropriately stands for Multi-Service Operators.

Today's cable MSOs are coming to recognize the potential of an all-services, all-screens offering purely as a consumer value proposition. However, shifting competitive dynamics and technologies also require cable operators to accelerate their time to market for an integrated offering. Cable operators are no longer the only MSOs on the block. Telcos, which already offer voice, Internet, and mobile services, are moving quickly to add video to the mix through the deployment of fiber-deep network infrastructure and Internet Protocol Television (IPTV).

Dueling cable and telco MSO dynamics aside, changes in consumer media and communications usage require a competitive response. Yes, cable's initial wireline IP telephone service offerings are proving to be highly successful. North American operators counted more than 3 million customers, adding 60,000 more customers per week, by March 2006. Time Warner Cable alone now boasts more than 1 million IP phone customers, leading the U.S. market. But at the same time as cable MSOs make inroads with voice over IP (VoIP), consumers are increasingly dumping their wireline telephone connections altogether. By the end of the decade, researchers like In-Stat predict as many as one in four consumers may solely rely on a mobile phone.

Furthermore, the mobile phone and other portable devices like the Apple iPod are morphing into mini-televisions. Most major mobile carriers are rolling out a range of broadcast and on-demand video services, creating new competition for cable's core franchise. Even players like Google are entering the fray, selling video-on-demand services to consumers through the Internet.

Of course, while the collision of mobile, wireline, Internet, and video services offer exciting new capabilities for consumers, it can also create many headaches. Consumers often contract different mobile, home telephone, cable television, and broadband Internet service providers. The result can be a frustrating hodgepodge of phone numbers, email and voicemail accounts, instant messaging buddy lists, passwords, and service subscriptions.

The first MSO -- cable, telco, or other -- that can bring this experience together will claim a key market advantage. Not only will today's service experience be vastly simplified, but a range of new integrated applications will also become possible.

In the near-term, this may include single-number telephone services with unified messaging. This could integrate landline and mobile phone services, as well as voicemail and email. Videophone services will enable visual as well as audio communications. Video-on-demand (VOD) entertainment services, as well as broadcast TV, will be available on mobile phones and other portable devices.

In the longer term, instant messaging buddy lists will be available across devices, as will premium video and audio content. Media stored on a personal video recorder (PVR) will be remotely accessible through a range of devices including mobile phones.

Required Infrastructure Capabilities

While it's easy to talk about converged services, delivering them is a challenge. The PacketCable 1.x infrastructure, now in full-scale deployment by MSOs, does one thing very well: it enables the delivery of lifeline IP telephony, essentially IP POTS (plain old telephone service), using DOCSIS 1.1+ broadband data networks. However, the PacketCable 1.x architecture requires specialized customer premises equipment (CPE) -- media terminal adapter (MTAs) -- that only connect to legacy telephones and fax machines.

What about MSOs that wish to enable services via "soft clients" that reside in PCs, game players, set-top boxes, PDAs, and dual-mode cell phones? How about presence-based services, so a user knows when a friend or family member is available to talk or exchange an instant message? What about offering multimedia services like video calling? And how can MSOs tie all these communications services together and integrate them with video and Internet offerings?

To deliver the all-services, all-screens vision, MSOs must be able to support a wide range of devices including soft clients. Presence, identity, and personalization management capabilities are critical to providing users more control over their experience. And if mobility is added to the mix, MSOs must be able to manage seamless session handoffs between cable and mobile access networks. Enhancements to PacketCable 1.x are required.

While PacketCable 1.x does not deliver these capabilities, the good news is another standards-based technology, Session Initiation Protocol (SIP), can meet these requirements and more. And IP Multimedia Subsystem (IMS) builds on SIP to create a layered, extensible architecture for multimedia communications. It's no surprise CableLabs is incorporating this protocol and architecture into its new PacketCable Release 2 specifications.

Table 2: PacketCable and SIP

Technology	PacketCable 1.x	Session Initiation Protocol (SIP)
Functionality	Centralized Network Call Signaling (NCS)	Distributed multimedia signaling architecture with presence & identity
Endpoints Supported	MTAs only for legacy phones & faxes	Any SIP endpoint, including: <ul style="list-style-type: none"> • SIP MTA • SIP phone & soft phone • Set-top box • Videophone • PCs & game consoles • Dual-mode handsets
Apps & Services	POTS via IP	Enhanced voice and IM services Videoconferencing Presence-based communications

Enabling Standards and Technologies: SIP and IMS

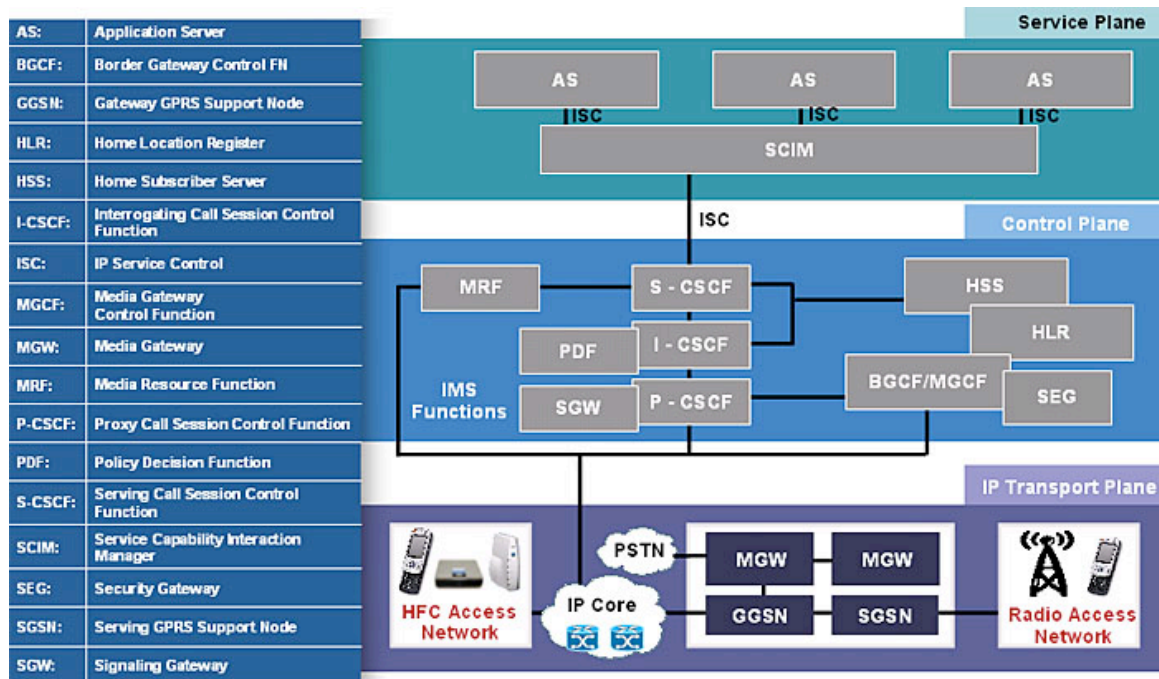
Service providers, as well as PC and CE software and hardware players, are evaluating the possible technical and business benefits of SIP for next-generation services. So what is Session Initiation Protocol? As the name implies, it is a signaling protocol used for initiating and managing sessions over an IP network. These sessions are Real-time Transport Protocol (RTP) packet streams of audio, video, or text communications. An open standard developed through the IETF, SIP uses smart clients -- either hardware- or software-based -- managed by network proxies and registrars. It is a flexible, distributed protocol that supports a wide range of multimedia applications, from voice calls and instant messaging to videoconferencing.

This extends the centralized approach of PacketCable 1.x, which employs call management servers (softswitches), media gateways, and MTA endpoints, to mimic the functionality of the PSTN.

SIP is just a protocol, of course, not a scalable, interoperable application and service infrastructure. Recognizing this, players in the mobile market decided to form the 3rd Generation Partnership Project (3GPP) and bridge the gap by developing the IMS specification. IMS has been embraced by other important standards bodies like ETSI, as well as by major carriers and vendors worldwide.

While IMS originated in the mobile market, it leverages SIP to support services across virtually any access technology. This is accomplished through the use of a layered architecture that separates network transport from the service control and application infrastructure. The IMS transport plane refers to a standards-based IP routing and switching infrastructure. The service control plane authenticates, provisions, and manages network users and devices. The application or service plane refers to servers that enable valued-added SIP services.

Figure 1: IMS Reference Architecture



In IMS nomenclature, the session control engine is called the Call Session Control Function (CSCF). It works with the Home Subscriber Server (HSS), a database with subscriber service parameters that is accessible to all IMS applications. This is a vast improvement compared to legacy data models. In those cases, each application has its own database, without a consistent method of inter-application communication for sharing subscriber information. The Breakout Gateway Control Function (BGCF) is the interface for interconnecting IMS with legacy networks.

In a nutshell, the CSCF is a SIP server that controls multimedia sessions, with several functional elements. The Proxy-CSCF (P-CSCF), a SIP proxy, is the first stop for a SIP client requesting service. It works with the Interrogating-CSCF (I-CSCF) to query and register the user for services. The Serving-CSCF (S-CSCF) accepts and authenticates user registrations, and then routes SIP sessions to users. All of this is done in concert with the HSS, which hosts the subscriber and subscription data needed to authenticate users and applications. Additionally, the HSS plays a critical role in coordinating DNS and security functions.

Using an access-agnostic control plane, IMS creates a flexible and extensible platform for IP multimedia services across cable, DSL, fiber, WiFi, and mobile networks. IMS also provides links into legacy mobile and PSTN networks, helping to bridge the packet and circuit, wired and wireless domains. The layered IMS approach enables complex applications to be created and deployed more quickly, reducing development costs and accelerating time to revenue for service providers. Additionally, because IMS is an open, interoperable standard, carriers can select among a range of vendor partners and avoid proprietary solution lock-in.

Connecting SIP, IMS and Cable

Because of the potential benefits of SIP and IMS, it is logical that MSOs are working to adopt the technologies as a foundation of their next-generation communications networks and services. In April 2006 CableLabs defined a cable-friendly SIP and IMS adaptation in its PacketCable Release 2 specification (formerly called PacketCable 2.0). The new Release 2 specification integrates PacketCable Multimedia (PCMM) functionality to provide backward compatibility with PacketCable 1.x, which will enable MSOs to continue deploying today's VoIP technology without risking infrastructure obsolescence.

MSOs can begin delivering some SIP services today using PCMM, an all-purpose platform for allocating dynamic quality of service (QoS) to any IP application delivered via DOCSIS 1.1+ data networks. Indeed, several cable operators are doing this already. For example, Canadian MSO Shaw Communications sells QoS capabilities to its customers for Vonage-like VoIP services.

SIP also presents challenges for MSOs. Its greatest strength -- flexibility for multi-device and multi-service support -- is also a weakness. The flexibility and the range of available SIP implementations make interoperability difficult. There are also regulatory concerns, such as meeting stringent CALEA requirements for lawful intercept, as well as emergency 911 and lifeline service reliability thresholds. However, each of these issues has already been

addressed successfully in the PacketCable 1.x domain.

Through PacketCable Release 2, the cable industry is fusing the flexibility of SIP and IMS with the proven interoperability and security successes of PacketCable 1.x and the dynamic QoS capabilities of PCMM. Although the Release 2 specifications have been published, availability of stable certified and qualified product solutions does not seem likely until 2007. Given this reality, it is no surprise that most major MSOs have decided to continue with their aggressive rollouts of PacketCable 1.x-based infrastructure.

When deployed, PacketCable Release 2 will offer MSOs an interoperable and secure platform for the delivery of enhanced voice and video communications. The platform will support a range of client devices, with intelligent presence and identity information, and enable MSOs to deliver reliable, personalized customer experiences to legacy PacketCable 1.x and SIP-based endpoints. Additionally, Release 2 will become a key enabler for integrated applications like caller ID on the TV, as well as fixed-mobile convergence (FMC) services.

Questions Remain for MSOs

While IMS and SIP are key building blocks for next-generation communications services, it is not yet clear whether they will directly address a critically important area for MSOs: the delivery of video entertainment services. Within the cable operator's network, PCMM can be used to provide QoS on the DOCSIS 1.1+ access network for IP video services. This implementation will also support Web and e-commerce services, multi-player gaming, peer-to-peer applications, and the like.

But what about sessions that leave a local DOCSIS network? For example, multi-player gaming can involve cable subscribers on different networks in different parts of the country. MSOs also want to offer video services to mobile subscribers. These cases pose the biggest challenges for MSOs aiming to achieve the all-services, all-screens vision. SIP and IMS may prove viable for non-communications options, or MSOs may opt for alternate technical solutions that meet their requirements. In all cases, MSOs will need to carefully select partners that can support converged IP backbones and service management solutions for both SIP/IMS and non-SIP/IMS applications. MSOs that set this goal up front and remain focused on an integrated end-game are likely to benefit from an infrastructure that can support both categories.

Evolutionary, Not Revolutionary path

Working with their vendor partners, MSOs can chart an evolutionary path to get from today's PacketCable 1.x networks based on NCS, to a PacketCable Release 2 infrastructure based on PCMM, SIP, and IMS. Rather than swapping out infrastructure, MSOs that plan carefully can leverage the elements they have already deployed, making targeted enhancements that are driven by business and not arbitrary technology goals. It is a "walk, then run" approach that has always worked well for MSOs.

Here are some examples of how MSOs may begin incrementally adding SIP and IMS solutions to their networks to reduce operating expenses and drive new revenue.

As a first step, MSOs can introduce SIP to their networks by using SIP route proxies to interconnect today's PacketCable 1.x call management servers (CMSs). A key enabler for this step is the separation of the logical functions of the PacketCable 1.x softswitch so the server can function as either a CMS or media gateway controller (MGC).

This allows MSOs to begin linking their softswitches over their own IP backbones, a move that can help cable operators to keep more calls "on-net." The alternative, handing calls off to the PSTN, incurs stiff interconnection fees with incumbent local exchange carriers (ILECs). Keeping calls on-net reduces operating expenses for MSOs, as well as their dependence on ILEC competitors for facilities and services. It also allows an MSO to ramp up their IP telephone subscriber base without scaling their PSTN interconnection infrastructure in direct proportion. This potentially delivers further capital and operating expense savings, as well as increased flexibility in terms of network topology.

Next, it is possible to add SIP servers to today's PacketCable 1.x network to enable enhanced calling features via embedded MTA endpoints. This includes value-added applications like customer portals, find-me and follow-me calling services, email delivery of voicemail messages, as well as caller ID on the TV, voice dialing, and click-to-dial capabilities. It is a smart way for MSOs to differentiate their services from those of the ILECs while continuing to leverage their PacketCable 1.x infrastructure investments.

With a SIP application environment deployed to serve residential customers, MSOs are poised to offer enhanced voice services for business customers, such as PBX and IP Centrex solutions. Doing so requires MSOs to deploy SIP-based MTAs, as well as the P-CSCF functionality specified within IMS. It is a manageable investment that will

enable MSOs to capture new revenue from the small-to-medium business (SMB) market segment.

As SIP-based MTAs are deployed, MSOs will begin to parlay the PCMM infrastructure they have installed for multimedia applications to offer enhanced communications services to business and residential customers.

Finally, with key SIP and IMS elements deployed on their networks, MSOs will be positioned to make the leap to a full IMS environment -- including SIP endpoint support -- to deliver comprehensive FMC services. This enables the quadruple-play with "roam-to-home" dual-mode mobile handsets, offering better in-home wireless coverage and the potential for a true one-number voice service with unified messaging. With the additional integration of subscription video, MSOs can deliver an all-services, all-screens experience to customers.

Conclusion

In conclusion, SIP, IMS and PacketCable Release 2 are emerging as enablers for MSOs that want to offer differentiated, converged applications with all-services, all-screens delivery. By selecting PacketCable and IP infrastructure vendors with reality-based evolutionary product roadmaps, MSOs will be able to add next-generation functionality to solutions being deploying today. With the right product roadmaps, MSOs can incrementally add applications and features, generating new revenues and cost savings, while avoiding stranded investments and service interruptions. Additionally, SIP and IMS, when deployed with converged IP backbone and service management solutions, can create a flexible foundation for responding to new service opportunities as they arise, positioning MSOs to extend their offering beyond the quadruple play.



*Cable Digital News is published by [Kinetic Strategies, Inc.](#)
10020 S. 46th Place, Phoenix, AZ 85044 USA
Phone: 480 598-9500 Email: mail@cabledigitalnews.com
Copyright 2006. All rights reserved.
Unauthorized duplication is a violation of applicable laws.*

Free subscriptions are available at www.cabledigitalnews.com/subscribe.html.
To unsubscribe, follow the instructions below

Please read our updated
[Terms of Use](#) | [Privacy Policy](#)