The Silicon Flatirons Roundtable Series on Entrepreneurship, Innovation and Public Policy
Report No. 7*

Open Standards, Open Innovation, and the Rollout of IMS

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Introduction

The Internet's open architecture has proved to be an engine of innovation. The traditional openness of the original TCP/IP protocol suite, however, is coming under pressure as broadband providers develop new network architectures that may, depending on how they are implemented, change the traditional model of "innovation without permission."[1] Notably, the advent of the IP Multimedia Subsystem (IMS) has raised three questions addressed by the roundtable: (1) what is IMS and why should policymakers care about its development?; (2) what opportunities and threats do the rollout of IMS raise?; and (3) what policy concerns—related to innovation and competition—are implicated by those issues?

On Friday, February 7th, 2009, the Silicon Flatirons Center held a roundtable discussion on Open Standards, Open Innovation, and the Rollout of IMS. The goal was to assess to what extent the emergence of IMS will be an instrument of control for carriers (whether to monetize access to the network—"put a cash register over the Internet," as critics have alleged[2]) or better manage traffic flows and open up opportunities for new and better ways of communicating (e.g., accessing text or voice messages from any device).[3] The roundtable was held at the University of Colorado Law School and was moderated by Silicon Flatirons' Founder and Professor of Law, Philip Weiser. Leading individuals from the telecommunications industry, academia, and Front Range entrepreneurial community participated in the roundtable, with Dale Hatfield of the Telecommunications Program at the University of Colorado and Dick Lynch, Chief Technology Officer of Verizon, as keynote speakers.

A principal takeaway was that the IMS network being deployed by Verizon would enable all customers to reach the Internet directly without being forced to use an IMS control layer. Moreover, a number of discussants distinguished the challenges that emerged with regard to the Advanced Intelligent Network (AIN) battles involving the old Bell System because that battle involved an effort to require a

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* The Silicon Flatirons Roundtable Series on Entrepreneurship, Innovation and Public Policy is sponsored by Brad Feld, Managing Director of the Foundry Group. This discussion on "Open Standards, Open Innovation, and the Rollout of IMS" was the seventh such event, following earlier ones on (1) The Unintended Consequences of Sarbanes-Oxley, (2) Rethinking Software Patents, (3) The Entrepreneurial University, (4) The Private Equity Boom, (5) The Promise and Limits of Social Entrepreneurship, and (6) The Social, Ethical, and Legal Implications of Social Networking. The reports from those discussions can be found at http://www.silicon-flatirons.org/publications.php?id=report.

[1] ROBERT D. ATKINSON AND PHILIP J. WEISER, A "THIRD WAY" ON NETWORK NEUTRALITY 5 (Information Technology and Innovation Foundation, 2006) (quoting Letter from Jeff Bezons *et al*. to Senators Ted Stevens & Daniel Inouye (Apr. 26, 2005) (http://netcompetition.org/docs/pronetneut/leaders_042506.pdf)), *available at* www.itif.org/files/netneutrality.pdf.

[2] *See* John Waclawsky, *IMS 101: What You Need to Know Now*, BUS. COMMC'NS REV., June 2005, at 6, *available at* http://www.oplan.org/documents/articles/IMS_need_to_know/fss_download/file; see also Letter from Ronald B. Yokubaitis, Chairman, Data Foundry, to Maureen Ohlhausen, Director, Office of Policy Planning, Federal Trade Commission (Feb 28, 2007) (http://www.ftc.gov/opp/workshops/broadband/presentations/yokubaitis1.pdf).

[3] *See* Stephen Lawson, *What IMS promises enterprises and carriers: Internet Protocol Multimedia Subsystem called key to converged, expanded services*, IDG NEWS SERVICE, Sept. 26, 2005, *available at* http://www.networkworld.com/news/2005/092005-ims.html.

firm to make available open interfaces that had never been exposed. By contrast, the traditional openness of the Internet is difficult to take away from application developers and end users once they are accustomed to it. Thus, the discussion ended on a note of guarded optimism that the deployment of IMS did not necessarily threaten the Internet as an open platform for innovation and competition in the manner depicted by some commentators.

This report proceeds in four parts. Part I explains "what is IMS?," explaining Verizon's vision of this technology and its historical analogs. Part II discusses the concerns and opportunities raised by this technology. Part III addresses how public policy should view IMS. Finally, Part IV offers a short conclusion.

I. What Is IMS?

For almost ten years, telecommunications companies (telecoms) have touted the IP Multimedia Subsystem (IMS) as the future service delivery architecture for providing converging wireline and wireless networks into a single IP-based network, i.e., fixed-mobile convergence.[4] During that time, the wireless standards consortium 3rd Generation Partnership Project (3GPP) has developed IMS's technical architecture. In particular, IMS uses the Session Initiation Protocol (SIP), a signaling and call setup protocol, to connect multimedia services from various simultaneously active application providers. The fundamental architecture difference between a network with IMS and the Internet is that the IMS architecture separates control from content by distinguishing between an application layer and a control layer. Based on its traditional architecture, the Internet lacks this capability.

A. The foundations of the IMS model

To start the discussion, Phil Weiser asked Dale Hatfield to explain how IMS operates and whether we should care about its development. Dale began by pointing out that much of the hype about the IMS architecture is based on its potential to allow telecoms to take control of their network back from the edge, a model which challenges the traditional "end-to-end" nondiscriminatory data transfer model of the Internet.[5] He drew from his experience as Chief of the Office of Engineering and Technology at the Federal Communications Commission to suggest that earlier network architectures with a control layer, like Advanced Intelligent Network (AIN), provide similar market opportunities to telecoms as does IMS. He provided the examples of the evolution of the railroad, Federal Express, electric grid, and telephone networks, to identify the trend that networks often evolve into separate layers for transportation and control, i.e., parallel communications networks. Similarly, he reasoned that the evolution of IMS is the telecommunications analog of a parallel communication network.

To appreciate the role of IMS, however, Hatfield emphasized that observers must distinguish between the public Internet and proprietary managed Internet-based networks. The public Internet consists of seamless connectivity between a "network of networks" using the TCP/IP protocol suite. This network involves both local access links (often provided over traditional telecommunications facilities, cable modems, wireless broadband connections, or other broadband technologies (such as satellite)) and the Internet backbone. As Hatfield explained, moreover, broadband providers—such as Comcast—often

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[4] *See* Waclawsky, *supra* note 2, at 18-20.

[5] *Id.* at 3 (arguing that under the IMS model "the Internet is no longer really about data transfer or the other "information" applications that it was designed for. The Internet, in this view, is the new television, a medium of audio and video entertainment distribution, and networks should be optimized for that."), also for a general discussion of the end-to-end principle and how it will evolve in the near future *see* DAVID D. CLARK & MARJORY S. BLUMENTHAL, THE END-TO-END ARGUMENT AND APPLICATION DESIGN: THE ROLE OF TRUST (Proceedings of TPRC 2007*), available at* http://www.tml.tkk.fi/Opinnot/T-110.7190/2008/spring/papers/04a_Clarke_t2t.pdf.

sell access to both the public Internet and to proprietary managed network services that use Internet technology. Comcast's Voice over Internet Protocol (VoIP) service is an example of the latter service. The significance of the latter type of service is that, by using a proprietary network, a provider can assure levels of quality of service that those using merely the public Internet (e.g., Vonage) cannot.

To appreciate the role of IMS, one must first understand the distinction outlined above between public Internet access and proprietary networks that use Internet technology. In particular, by definition, IMS functionality will be available to those subscribing to a proprietary service, but will not available to users of the public Internet more generally. In this sense, as noted below, IMS can be understood to be an "overlay technology." Indeed, part of the effort to deploy IMS rests on the fact that, under current technical/economic arrangements, there is no way of assuring the required quality of service (QoS) across different public Internet domains. A second rationale for deploying IMS is that it would enable different IP-based IMS networks (wired and wireless) to interoperate with one another. Consequently, for independent application developers, there are two basic choices: negotiate to attach their content/application servers to the managed IMS network operated by, say, Comcast or Verizon or they can simply attach them to the best-effort, public Internet. In theory, the success of IMS deployments will thus depend on their ability to provide enhanced functionality above and beyond what is available using the public Internet.

B. How does the IMS architecture work?

Many in the group had questions about how the IMS model worked in practice and, in particular, how it might change the Internet's traditional open architecture. Dale Hatfield suggested that a key benefit of the IMS model for telecoms derived from the ability to use SIP as a control layer that would perform sophisticated routing of communications to specialized applications, providing those applications with added value and differentiating the underlying network from their competitors.[6] Under this model, it would remain to be seen whether applications developers create new services for IMS-based networks as opposed to those available via the traditional Internet.

Dick Lynch followed Dale's overview by explaining how Verizon is using the IMS model to add value for its customers and enable third party applications to operate more effectively.[7] In particular, the Verizon implementation of IMS operates as an "overlay technology" that enables Verizon's customers to access its certified applications. If, for example, a Verizon customer wants to get to Verizon's call forwarding application, the Verizon IMS would take that request from any SIP-enabled device and route it to Verizon's specialized call forwarding application. If, however, the same request was made by a customer without access to Verizon's call forwarding application, then Verizon's IMS would decline the request.[8]

Dick Lynch explained further that the Verizon IMS strategy is not about providing devices with proprietary software, but instead about enabling the network to better serve any SIP-enabled device. Under its planned strategy, Verizon will charge the application providers a reasonable licensing fee to be part of the Verizon network and thus become one of Verizon's certified application providers. In other

[6] For a generic pictorial view of the IMS architecture *see* Waclawsky, *supra* at p. 1-2.

[7] The Verizon IMS can, also, be seen as a head end server of an entire server farm that is not a physical server farm in a particular location but a theoretical server farm where applications are provided by a variety of people, in a variety of ways, from a variety of people, and not all necessarily from Verizon.

[8] In this situation, where the customer does not have access to Verizon's specialized application, Verizon's only involvement with the request will be a single query by the Verizon IMS to route the request to the proper location.

words, they will be an end-point on the Verizon network, enabling them to operate more effectively.[9] He noted, however, that while Verizon would not prevent or deliberately degrade the customer's service, applications run from outside the Verizon network would not be as likely to operate as effectively as the applications run from within the Verizon network because there is no control over the quality delivered across the Internet.

C. Why does the IMS architecture raise concerns?

Dale Hatfield addressed some of the concerns that IMS raises by analogizing it to AIN.[10] First, he noted, referencing the AIN scenario, that since the user cannot signal end-to-end before the call is set up, the person controlling that signaling network has a lot of power. Second, he explained, that when there is competition between networks with control layers, each competing network wants access to the call triggers controlling the call, raising the question whether the customer has a choice over who should have control of their call. Third, he added, if a network has market power, it remains to be seen whether it will give up control of the processing of the call, i.e. will it maintain an open signaling interface or will it require users to work with its proprietary processors and databases? Highlighting this point, he explained that a tension emerges from the potential competition between a network provider's own (or affiliated) proprietary application servers and rival applications that ride on the Internet.

Dick Lynch admitted that Verizon could design its IMS architecture to be as restrictive as possible, but he emphasized that neither Verizon, nor other telecoms in his estimation, have the incentives to use IMS to make their networks restrictive, since the ubiquity of broadband is the ultimate driver of the Internet.[11] Stu Elby, Verizon's VP of Network Architecture, added that Verizon's model does not use "walled gardens" because customers can choose whether they will point their call at the Verizon network or at the Internet to reach an application server like Google's or Microsoft's proxy server.[12] If the customer chooses to access the Internet directly, then the Verizon IMS network will have no interaction with that customer's communications. Dale Hatfield likened this to the choice between long distance carriers where the customer has a choice of networks once they get past the access network. Dick Lynch and Stu Elby agreed that Dale's analogy was a fair categorization. In conclusion, Dick Lynch highlighted that the ultimate goal of IMS is to enable the various carriers' networks to work together so that customers could access a seemingly unified network from any SIP-enabled device, regardless of the underlying access network.

II. The Threats and Opportunities Raised by IMS

IMS provides telecoms with many new opportunities to meet the challenges of converged networks (i.e., to enable applications to operate from a range of networks in a seamless fashion), to better

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[9] Verizon certified application providers would have access to Application Programming Interfaces that they have not had access to before so that they can work with the Verizon network.

[10] IMS looks like AIN but the transport network is an IP packet network, rather than a TDM network, capable of carrying voice, data, image, and video.

[11] This point reflects the basic premise—called "internalizing complementary efficiencies," or ICE, by Joe Farrell and Phil Weiser—that a platform provider has the incentive to maximize the value of its platform by encouraging as many applications as possible to use its platform. *See* Joseph Farrell & Philip J. Weiser, *Modularity, Vertical Integration and Open Access Policies: Towards A Convergence of Antitrust and Regulation in The Internet Age*, 17 Harv. J. L. & Tech. (2003).

[12] There is a great deal of literature about the controversial use of generic IMS models with walled gardens. For a sample of those opinions, *see* Fred Goldstein, *Quality of Service Doesn't Justify IMS Walled Gardens*, TMCNET, Nov. 5, 2007, *available at* http://www.tmcnet.com/enews/e-newsletters/voip-hot/20071109/13923-quality-service-doesnt-justify-ims-walled-gardens.htm; *see also* Ronald Gruia, *IMS and Net Neutrality*, IMS Mag., Aug. 2007, Vol. 2, Num. 4, *available at* http://www.tmcnet.com/ims/0807/analysts-corner-0807.htm.

manage resources on their network, and to provide applications for a variety of SIP-enabled devices.[13] Despite the buzz around IMS in the telecom industry, actual deployments are still modest.[14] Telecoms attribute the stalled adoption, primarily, to high infrastructure costs, unrealistic expectations, and a lack of industry understanding.[15] Consumer representatives attribute the stalled adoption, mainly, to the lack of clarity of whether the IMS model is aligned with consumer's needs, the lack of interoperability, and the threat to net neutrality principles posed by quality of service (QoS).[16]

A. What Opportunities Are Afforded By IMS?

Many discussants highlighted the changing needs of telecoms that are driving them to embrace IMS. Barbara van Schewick, Assistant Professor of Law at Stanford Law School, asked why the changing needs of telecoms could not be met with the present functionality provided by IP.[17] Stu Elby answered that IMS was born out of the wireless world, because the Internet's end-to-end principle does not work well with mobility. He provided the example of a user using an Internet application from New York to Colorado. In this instance the user's IP address changes constantly, thus inhibiting the ability of the application to find its way back to the customer. Any one carrier can maintain the connection using proprietary techniques, but presently the customer cannot roam between multiple carriers due to the lack of a shared mobile standard. For this reason, he explained, the 3GPP designed IMS with SIP to be the standard to allow global roaming. Since its inception as a standard, IMS has become an architecture that provides many other opportunities that benefit telecoms around the world.

1. IMS and Converged Services

Pieter Poll commented that the IMS model allows carriers to provide services from a number of application servers over a number of parallel IP networks, one of which could be the Internet. He pointed out that the attraction of building an overlay on IP is that it is connectionless. This removes some of the complexity out of developing applications for IMS since many people already use the IP standard. Poll further explained interoperability between different carriers' IMS networks and devices is enhanced.

Chris Kennedy of Comcast highlighted that much of the benefit of IMS comes from its ability to handle the convergence of wireless and wireline networks. Dick Green, Chief Executive Officer of CableLabs, emphasized Kennedy's point that this convergence has provided a forum for stakeholders to come together to solve practical problems in a common framework, i.e., common identity structure,

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[13] For an article describing the potential opportunities created by the IMS model *see* Matthew Lucas & Jerry Lucas, *Editorial: IMS: God's Gift to the Telecoms and Their OSS/BSS Venders*, BILLING & OSS WORLD, Mar. 1, 2006, *available at* http://www.billingworld.com/articles/editorial/Editorial-IMS-Gods-Gift-to-the-Telecoms-and.html.

[14] Joe McGarvey, Principal Analyst of the Carrier IP Telephony group, reasons that the delayed adoption has been caused by the realization by "operators that IMS – though promoted as an anti-overlay architecture – is the overlay to end all overlays" and the development of other Web 2.0 technologies, like service delivery platforms and web services. However, he argues that Telecoms still see IMS as part of the foundation of the future service delivery infrastructure. *See* JOE MCGARVEY, IMS STATUS REPORT: A PROTRACTED ADOPTION 1-6 (Current Analysis Inc., 2008), http://www.google.com/url?sa=U&start=1&q=http://www.currentanalysis.com/m/ericsson/CurrentAnalysis-IMS.pdf&ei=foeSSfvNOIK2sQPP0tyvCw&usg=AFQjCNGoqm7bhOg4WT2PdGwerhCMPxqUMA.

[15] *See* JOE MCGARVEY, IMS STATUS REPORT: A PROTRACTED ADOPTION 1-6 (Current Analysis Inc., 2008), *avavalible at* http://www.google.com/url?sa=U&start=1&q=http://www.currentanalysis.com/m/ericsson/CurrentAnalysis-IMS.pdf&ei=foeSSfvNOIK2sQPP0tyvCw&usg=AFQjCNGoqm7bhOg4WT2PdGwerhCMPxqUMA.

[16] *See* Fred Goldstein, *Quality of Service Doesn't Justify IMS Walled Gardens*, TMCNET, Nov. 5, 2007, *available at* http://www.tmcnet.com/enews/e-newsletters/voip-hot/20071109/13923-quality-service-doesnt-justify-ims-walled-gardens.htm

[17] Professor Schewick provided that different application servers can use IP to provide functionality to different devices in a way that is network agnostic.

common interfaces, common application servers, and put those best practices into a single, integrated-service system.

2. IMS allows devices to use applications more efficiently

Dick Lynch explained that in a traditional wireless environment, radio protocols don't allow the carrier to control what the presentation back to the wireless device will look like. With IMS, carriers can use a transcoder and render the screen size within their network, which in turn would make the device less resource intensive and less costly. He added that to do this, the carrier must certify that the device meets a minimum functionality requirement before it works on the carrier's network. After a device is certified, it could come equipped with its own applications, as long as those applications do not degrade the carrier's network. An Amazon Kindle, for example, could work on Verizon's network as long as the radio frequency module, which allows wireless communications, is compatible with Verizon's network. The device's memory, processor, and functionality, by contrast, would not exclude the device from working on Verizon's network.

3. The Limitations of the IMS Solution

All of the participants recognized that IMS is not the only way to solve the changing needs of telecoms and that many telecoms have chosen different solutions. Pieter Poll suggested that, although IMS is one platform with which network providers could provide unified services, the company is still evaluating its use in the Qwest network.[18] He indicated that the reluctance of providers to adopt IMS could be attributed to the current state of IMS deployment in the United States because the IMS standards are not yet widely adopted. Dick Lynch and Stu Elby agreed that, if only one carrier had an IMS platform, it would be underutilized; the true value of IMS is magnified multifold if IMS is a standard that multiple carriers adopted. Highlighting the magnitude of this trend toward interoperable SIP-based services, Chris Kennedy said that a fair amount of the work he does at Comcast is seeking to facilitate SIP-based interoperability with other carriers. The discussants all recognized that presently the standards surrounding IMS are still being debated and stakeholders must continue to work together to fully integrate IMS. Many of the discussants noted that, as more carriers adopt the IMS model, holdout-carriers might be pressured into adopting IMS to resolve interoperability concerns.

B. How will the IMS model disrupt the Internet's ecosystem?

Ed Felten, Professor of Computer Science and Public Affairs at Princeton University, asked the discussants if there were alternatives to IMS that would not require so much disruptive infrastructure yet still serve the changing needs of telecoms. He explained that adopting a new infrastructure would shake up the status quo and create new areas of market dominance to be captured. Dick Lynch answered that IMS is more of an overlay technology, which carriers can choose to interoperate with, rather than a replacement architecture, which carriers must necessarily interoperate with. Additionally, if the customer does not want to interact with the IMS layer they can choose not to; however, he expected that the IMS layer would be able to provide new services and better functionality that customers would come to take advantage of.

1. The IMS Architecture

Many in the group highlighted the role that open innovation plays in the Internet ecosystem and expressed concern that adopting IMS could potentially undermine this dynamic. Mark Cooper, Director

[18] Dr. Poll said that Qwest has developed an applications framework that relies in part on web services in addition to IMS components.

of Research at the Consumer Federation of America, questioned whether the good intentions promised by telecoms would prevent anticompetitive harms from occurring. In light of this concern, he suggested three points that should be resolved before IMS is implemented. First, what sort of revenue arrangement would telecoms use, i.e., most favored nation or nondiscriminatory and nonexclusive? Second, although the telecom might promise not to degrade the signal from public application servers reached though the Internet, will they agree to provision resources equally between their own network and the Internet? Third, will telecoms agree to allow access to enough of their APIs to application developers to replicate the same level of functionality available to those with access to its IMS network?

2. *Lack of interoperability*

Phil Weiser addressed the multi-vendor interoperability problem by asking the group if there would be services that will not work unless they share a compatible IMS standard. He suggested that the case study of short message service (SMS), which did not come to America for years because carriers could not agree on a compatible standard, was a relevant analog to the development of IMS. Dick Lynch rejected that claim, however, suggesting that the delays in the adoption of SMS were not explicable on that ground. Moreover, drawing from his years of experience working in the wireless industry, Dick Lynch assured the discussants that if the end device standard differs from the standard at the other end, an IP transcoder would be necessary, but that it would be a relatively easy conversion in an IP environment—distinguishing IMS from SMS, where a lack of interoperability prevented the successful development of the product by any individual carrier.

Pieter Poll reasoned that IMS would face fewer interoperability hurdles than architectures with control layers in the past because, unlike AIN, it works over IP. He explained that because IP is an already established standard, many of the multi-vendor interoperability issues have already been resolved. He added that IMS would also benefit from the large pool of application developers who are already experienced in developing programs for IP. However, he recognized that many developers are presently used to a web services model rather than an IMS model.

3. Potential threat to net neutrality principles posed by selective quality of service offerings

Barbara van Schewick asked Verizon's representatives to explain what specific circumstances would produce lower quality of service. Dick Lynch said the degradation in QoS is a product of the "best efforts" nature of the Internet. He explained that since IMS sits on top of the IP transport network, once the packet leaves the carrier's network, they cannot control what happens in other networks or server applications and, thus, can no longer ensure a high QoS to customers. He admitted it was possible for carriers to charge every "call" that went through their cloud like a toll-gate, in what some critics have called the "cash register over the Internet" model, but Verizon would not tolerate this model. Dick Green and Chris Kennedy agreed and emphasized the negative effect a toll-gate model would have on the whole system.

III. IMS and Public Policy Concerns

The Internet ecosystem has thrived on account of the ability of an open platform to facilitate high levels of innovation and competition. In light of this history, policymakers are interested in any development, such as the deployment of IMS, which could alter the nature of the Internet ecosystem. Policymakers are thus interested in understanding the emerging IMS architecture, the opportunities it raises for new and enhanced services, and any threats it poses.

A. What are the concerns?

Ed Felten asked what would cause carriers and application providers on the boundary of a carrier's IMS network to choose to innovate on that carrier's IMS network rather than developing a rival network? Phil Weiser added to that question the issue of how would a carrier influence other carriers and application providers to interoperate with their IMS network? Both points underscore how the advent of IMS raises a classic standard setting dilemma—whether, when, and how should government be involved in this process.

A revealing discussion on the various roundtable carrier representatives' uses and deployment strategies for IMS begged the question, "how will vendors and application providers be able to invent devices and services for multiple carriers' IMS deployments, each with their own standards?" Shane Greenstein, Professor at Northwestern's Kellogg School of Management, challenged the assumption that standards can remain open over time.[19] Dick Lynch disagreed with Shane's argument and emphasized it is in the carriers' best interest to work together to develop common standards that enhance the customer's experience. He added that proprietary applications, rather than proprietary standards built into the IMS architecture, would be the added value that carriers could provide to their customers. He explained that a carrier, whose architecture is not interoperable with another carrier's architecture, runs the risk of losing a customer because they are not able to use the other carrier's network and the valuable proprietary applications provided on it. For this reason, he said, carriers cooperate with each other to develop standards that evolve together. Dick Green added that scalability, as well as interoperability, is another factor that produces cost savings and incentivizes carriers to work together.

Andy Crain, Vice President and Deputy General Counsel of Qwest, highlighted that rather classifying companies as good or bad, we should ask whether it is in the carrier's economic interest to make the system open and that customer demand has proved to be a sufficient check on company behavior to keep the Internet open. He argued that carriers would not build IMS on proprietary standards and charge prohibitive costs on application providers outside their IMS network. He noted that, for example, customers would not allow Qwest were to charge Google a fee restricting their customers' access to Google's applications, because customers would quickly switch to cable providers or other competitors. Phil Weiser underscored this point by explaining that, unlike in the AIN case, where the architecture (which did not allow end-to-end signaling) may well have prevented innovation from independent developers, the Internet's currently open architecture facilitates such innovation and any effort to curtail it would deprive consumers of something they currently have. In short, taking something away from consumers that they already have presents a very different dynamic—and is far more difficult to achieve—than designing an architecture that would prevent consumers from gaining access to innovations that they don't even know could exist.

Phil Weiser raised the question of how carriers would deal with vendors' attempts to use proprietary standards. Pieter Poll explained that it would be in the best interest of each carrier to support an environment of open standards to encourage innovation and lower costs for all carriers. Dick Lynch agreed with Pieter, adding that he would tell application providers using proprietary standards "to go back and think about their proposition," because he would not accept that.

Jim Speta, Professor of Law at Northwestern University, asked the group how they anticipated application providers would be able to work with the next generation of customer devices. Specifically, he was interested in whether an application provider, outside the carrier's IMS network, would be able to embed and run an application on a customer's device connected to the carrier's IMS network without talking to the carrier's IMS network. Phil Weiser said that it would depend on the device—if the device were an open device, like the Google Android phone, then it could run any application provider's programs. Dick Lynch agreed with Phil's comment and highlighted that, although most devices on the

[19] Phil Weiser brought up the TCP/IP standard as a notable exception to Shane's point.

market today are dependant on a single carrier to serve it applications, the trend for new devices is to be application agnostic.

B. What problem, if any, should policymakers address?

Phil Weiser asked the discussants whether the "engineering ethos," taken alone, would ensure a compatible open system that will serve our long-term needs without some enforcement mechanism. Some discussants expressed some concern that although the current structure of the market may not provide the incentives for carriers to use IMS in an anticompetitive fashion, the market may change and it would be too late to put limitations on the IMS design and functionality. Dale Hatfield said he was encouraged that there would be publicly available interfaces between the application and transport layer to start with. He added, however, that for interfaces that are not feasible to expose now, the architecture should be designed so that those interfaces may be required to be exposed in the future. Barbara van Schewick emphasized Dale's point by providing the example of cable modems, which were not designed for open access and later had to go through a costly redesign to open them up.

Pierre de Vries questioned the basic assumption of whether there was really a demonstrated concern that needed to be fixed. Anna-Maria Kovacs, President of Regulatory Source Associates LLC, agreed with Pierre that we should wait for the technology to evolve rather than risk choking off experimentation too soon and stunting IMS's development at an early stage. Mark Cooper challenged that point by questioning the wisdom of waiting until there is a demonstrated concern before imposing limitations on IMS design and functionality. He argued the only reason that the Internet remains an open platform today, is because regulators protected it from proprietary standards before a demonstrated concern arose. He concluded that if we could all agree on and enforce open standards, we could ensure the IMS platform would remain a healthy platform for innovation and competition.

IV. Conclusion

This Roundtable assessed whether IP Mulitmedia Subsystems (IMS) will be an instrument of control for carriers or whether it will open new opportunities for communications. The discussion highlighted how the implementation of IMS, particularly as envisioned by Verizon, is as an "overlay" technology to the existing Internet protocols to facilitate SIP-based, multimedia sessions (including for voice and video communications). In principle, this overlay technology could be available to third party application developers and would not, as Verizon's Lynch explained, interfere with existing Internet traffic.

In evaluating the emerging IMS technology, Dale Hatfield concluded the session by highlighting that "architecture is policy." In so doing, he did not argue that proactive intervention was necessary, but rather that it is critical for policymakers to understand how the architecture works and whether it is being built in an open, transparent manner. In that respect, the discussion ended on a note of guarded optimism that the deployment of IMS would not threaten the Internet as an open platform for innovation and competition in the manner, as some commentators have suggested. Notably, this optimism rests on the points that the network providers appear to be sensitive to the concerns about how the Internet's architecture could evolve in ways that would undermine the traditionally open Internet and that users are likely to be vigilant about protecting the opportunities available to then under this traditional architecture. Of course, only time will tell if this turns out to be the case.