

November 22, 2005

TO: Any and All Interested Parties

FROM: Cable Television Laboratories, Inc.

**SUBJECT: REQUEST FOR INFORMATION -
CableLabs® Voice over IP (VoIP) Peering Project**

Enclosed, please find a Request for Information (RFI) to provide Cable Television Laboratories, Inc. ("CableLabs") assistance in defining the technical scope, requirements and architecture for VoIP Peering between cable MSOs in a production environment. For responses to be considered valid, all RFI responses must follow the critical dates outlined below.

Critical Dates

1. Questions Regarding the RFI

Respondent should notify CableLabs in writing of its intent to submit a response to the RFI by sending a Letter of Intent to the CableLabs authorized person **by 5:00 PM Mountain Time, November 30, 2005**. Questions regarding the RFI must be submitted in writing via facsimile and email to the authorized Contact Person **no later than 5:00 PM Mountain Time on November 30, 2005**. Every reasonable attempt will be made to promptly answer all inquiries from each Respondent. Respondent understands and agrees that it has a duty to inquire and seek clarification regarding the RFI wherever Respondent does not fully understand the RFI or wherever Respondent believes the RFI may be interpreted in more than one manner.

If Respondents' questions are material to the content of its RFI response or result from ambiguities contained in the enclosed documents, a written reply to such questions will be issued to all Respondents by **December 5, 2005**. CableLabs reserves the right to not answer any question(s) that CableLabs feels are not pertinent to Respondent's submittal. However, questions that are answered will be shared with all Respondents who have indicated their intent to respond to this RFI. Questions directed to any employee of CableLabs other than the designated contact person may constitute immediate disqualification from further discussions and/or consideration.

2. RFI Response Due Date

Information must be delivered to the Contact Person on or before **12:00 noon Mountain Time on December 14, 2005**. **Information received after this deadline will not be considered and individual extensions to the due date will not be granted.** All supporting materials and documentation must be included with each copy of the submitted information, and provided in electronic format (on a CD or via email to the Contact Person).

Organized, succinct and straightforward submissions are appreciated. There is no need to submit an unnecessarily elaborate RFI response.

Sincerely,
Ed Miller
Vice President, Advanced Network Systems
Cable Television Laboratories, Inc.
Attachments

CableLabs[®]

Request for Information
VoIP Peering

November 22, 2005

Responses due December 14, 2005

Cable Television Laboratories, Inc.
858 Coal Creek Circle
Louisville CO 80027-9750
Phone: +1-303-661-9100
<http://www.cablelabs.com>

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CableLabs VoIP Peering RFI

SECTION 1:

GENERAL ADMINISTRATIVE PROVISIONS

1 General Administrative Provisions

1.1 STATEMENT OF PURPOSE

CableLabs is seeking information regarding the development of a production-grade VoIP Peering infrastructure to allow VoIP traffic exchange among MSOs, and, between MSOs and other VoIP partners.

Through this RFI, CableLabs is seeking information on the technical scope, requirements, protocols, architecture, management and operations considerations to support the CableLabs VoIP Peering architecture. Further detail on the proposed scope of the CableLabs VoIP Peering architecture can be found in section 2.4.

1.2 BACKGROUND

Initiated by CableLabs member companies, the MSO VoIP Peering project is a CableLabs-led initiative aimed at developing technical requirements, architecture and interoperable protocol specifications for delivering end-to-end VoIP and other real-time multimedia communication exchanges between service operators. The VoIP peering initiative addresses requirements for establishing a production platform to exchange VoIP traffic between operators.

Additional background on the CableLabs VoIP Peering initiative can be found in section 2.

1.3 CRITICAL DATES

<u>Process Step</u>	<u>Date Completed</u>
Issue of RFI	November 22, 2005
Respondents inform CableLabs of their intent to respond	November 30, 2005
Respondents Submit Questions	November 30, 2005
CableLabs Provides Response to Questions	December 5, 2005
Response Due Date	December 14, 2005

1.4 CRITICAL DATES DEFINED

1.4.1 Issue of RFI

The RFI will be issued to all Respondents on November 22, 2005.

1.4.2 Respondents inform CableLabs of their intent to respond

Each Respondent should notify CableLabs in writing of its intent to submit a response to the RFI by providing a Letter of Intent. The Letter of Intent must be sent to the CableLabs authorized person in writing via email or fax by 5:00 PM Mountain Time, November 30, 2005.

The Letter of Intent is not a requirement for the submission of a response. However, a timely Letter of Intent is necessary to assure receipt of responses to Respondent questions (1.4.3. and 1.4.4.), any and all changes, amendments and addenda issued by CableLabs.

1.4.3 Respondents Submit Questions

Questions regarding the RFI may be submitted to the CableLabs authorized contact person in writing via facsimile or email anytime before 5:00 PM Mountain Time on November 30, 2005 (Submissions by email preferred).

1.4.4 CableLabs Provides Response to Questions

CableLabs will answer any Respondent questions that it considers appropriate and that will clarify the contents of the RFI. Such questions will be compiled and answered. All Respondents having indicated their intent to respond to the RFI will receive the document from CableLabs providing answers to pertinent questions to be e-mailed on December 5, 2005. CableLabs is not obligated to answer all Respondent questions. For example, questions regarding the number of RFI packages sent out, or specifically inquiring whether particular companies received RFI packages will not be answered.

1.4.5 Response due date

Information must be delivered to the Contact Person mentioned in section 1.5 on or before 12:00 noon Mountain Time on December 14, 2005. Information received after this deadline will not be considered and individual extensions to the due date will not be granted. All supporting materials and documentation must be included with each copy of the submitted information.

1.5 CABLELABS AUTHORIZED CONTACT PERSON

Jean-François Mulé
Vice President, IP Technologies and Services
Cable Television Laboratories, Inc.
858 Coal Creek Circle
Louisville, CO 80027-9750

Phone +1-303-661-3708
FAX +1-303-664-8174
Email jfm@cablelabs.com

1.6 CABLELABS RFI POLICY

CableLabs reserves the right to reject any or all RFI responses or portions thereof and to cancel or change this RFI or any portion thereof. Neither CableLabs nor its members shall incur no obligation or liability whatsoever by reason of issuance of this RFI or action or inaction by anyone relative thereto. All RFI responses will be the property of CableLabs and will not be returned.

CableLabs and CableLabs' members will review responses to the technical information requested below ("Technical Information"). Respondents to this RFI may receive feedback as to the responsiveness of their Technical Information responses as well as any specific technical questions from CableLabs or its members. No decision has been made as to whether a follow-on request for proposals will be necessary. In addition, because this document is a request for information, CableLabs does not seek any specific price information and none should be included in your response to CableLabs. Section 2.7 of this RFI contains information regarding those CableLabs' members that do seek service pricing information.

There will neither be a ranking of responses nor an "approved vendor" list resulting from this RFI. CableLabs' members who receive responses to this information will then make their own, independent business judgments about which if any manufacturer to deal with and which equipment, if any, to purchase. CableLabs reserves the right to extend or shorten the time schedule, as necessary, or cancel the RFI completely. The schedule may be altered to take into account any necessary clarification as well as time needed to accomplish the various levels of review. Respondents will be notified of any change in the schedule.

1.7 RESPONDENT'S RESPONSIBILITY

Respondent must analyze and respond to all sections of this RFI, unless otherwise noted, by providing sufficient information to allow CableLabs to evaluate Respondent's RFI response. Respondent agrees that any costs incurred by the Respondent in responding to this RFI, or in support of activities associated with this RFI, are to be borne by Respondent and may not be billed to CableLabs. Respondent need not respond to every Technical Requirement in this RFI.

1.8 CONFIDENTIALITY

All information delivered to CableLabs in response to this RFI shall be submitted by each Respondent without any obligation of confidentiality on the part of CableLabs or any of its members, unless the information is appropriately labeled as "CONFIDENTIAL" and is not within any of the exceptions to confidentiality set forth below ("Confidential Information"). Except as required in connection with review and evaluation of the proposal, CableLabs and the participating members will not use or disclose any Confidential Information submitted by any Respondent without prior written consent of that Respondent. Access to Confidential Information submitted in response to this RFI shall be restricted to those officers, board members, employees, consultants, and other agents of CableLabs and its participating member companies who have a need to know the information to properly accomplish their review and evaluation activities. Other CableLabs members may have access to the Confidential Information if they agree in writing to be bound by the terms of this section. All persons having access to the Confidential Information shall be contractually bound to maintain its confidentiality.

1.8.1 Confidential Information

Confidential Information shall not include any information which:

- prior to submission is known by, or is in the possession of, CableLabs or the participating members without any restriction on its use or disclosure;
- is currently available, or becomes available, to CableLabs or the participating members from a third-party without any non-disclosure obligation in favor of the company originally supplying the same;
- is or becomes generally known or readily ascertainable in the cable television industry (or industries supplying or servicing that industry) through no fault of CableLabs or the participating members; or
- is independently developed by CableLabs or the participating members.

In each case, the burden of providing the applicability of the exception from confidentiality shall be on the party claiming the exception.

CableLabs and the participating members shall have the right to disclose Confidential Information in response to a court order or government authority's request, after first notifying the company owning such Confidential Information of such required disclosure.

Confidentiality of Verbal Information:

If information which is considered to be confidential is presented verbally, the following procedure must be adhered to:

- the confidential information shall be noted as such during the verbal presentation; and
- all confidential material presented verbally shall be identified in writing by the disclosing party within fourteen days.

Any obligation to maintain the confidentiality of Confidential Information submitted by any company in response to the RFI shall terminate and all non-disclosure obligations shall cease two years following the date of submission.

1.9 COMPLIANCE OF INFORMATION

A duly authorized representative of Respondent must sign information. An unsigned RFI response will be rejected.

1.10 CONFLICTS

Should there be conflicts between the requirements of this RFI and any Respondent-provided or Respondent-referenced applicable specification, standard, or publication, Respondent must identify such conflicts in its Information. Such identification by Respondent will not, however, have the effect of modifying CableLabs requirements under this RFI unless CableLabs specifically acknowledges a modification in writing. Absent written modification by CableLabs, the requirements of this RFI shall prevail and govern.

1.11 QUALIFICATION AND AVAILABILITY

During the time CableLabs is evaluating the RFI responses, Respondent should be prepared, at CableLabs request, to explain its RFI response. CableLabs reserves the right, at its discretion, to conduct meetings with Respondents at any time during the RFI process. Such meetings must be scheduled and facilitated by the CableLabs authorized Contact Person who, in consultation with CableLabs, will define guidelines by which meetings will be conducted.

1.12 RESTRICTED COMMUNICATIONS

It is the policy of CableLabs to avoid situations which (1) place it in a position where its judgment may be biased; (2) create an appearance of conflict of interest with respect to rendering an impartial, fair, technically sound and objective decision prior to selection; or (3) give an unfair competitive advantage to competing Respondents. Therefore, to ensure an ethical evaluation process, all inquiries or other communications regarding this RFI shall be exclusively directed to CableLabs Authorized Contact Person as detailed in Section 1.5.

Respondents are hereby expressly instructed not to communicate with CableLabs, officers or employees regarding this RFI. This prohibition is also applicable to Respondents' affiliates, officers, employees, contract people, consultants, and subcontractors. Any unauthorized communications with CableLabs, officers or employees may result in the disqualification of Respondent's Information, if such action is deemed in the best interest of CableLabs.

Should Respondent, its officers, employees, contract people, or other representatives have any question regarding the propriety of an anticipated communication with CableLabs, that communication should not be made without prior consultation with the Authorized Contact Person.

SECTION 2:

TECHNICAL REQUIREMENTS

2 Technical Requirements

2.1 OVERVIEW

As described previously in this document, CableLabs and its member companies are interested in the development of technical requirements, architecture, and interoperable protocol specifications for delivering end-to-end VoIP and real-time multimedia communication between service operators. This desire resulted in a CableLabs initiative to better understand the open standards-based technologies available to facilitate end-to-end VoIP communication exchanges between service operators. The following sections provide a high-level overview of the work accomplished to date.

2.2 PROBLEM STATEMENT

The Internet is a set of interconnected IP networks allowing IP traffic to flow between Internet hosts. To take advantage of the end-to-end connectivity nature of the Internet, a number of service providers (Internet Service Providers – ISPs, Network Service Providers also known as IP Backbone Providers) have used interconnection agreements to exchange IP traffic transparently. These bilateral agreements are commonly called peering agreements, referring to the two IP network providers as peers in IP traffic exchange (at layer 3). The main advantage for IP network providers to peer is to reduce the amount of traffic that transits between the two networks via third party backbone providers. Such an arrangement has the effect of reducing network costs and increasing quality of service. A number of MSOs have already established such IP network peering arrangements among themselves and with other Internet providers. IP Network Peering is by definition peering at the IP layer and is therefore application-agnostic.

The notion of IP Service Peering (and VoIP Peering) emerges as a natural extension of IP network peering. IP Service Peering extends the relationship between network operators above the IP layer, by handling the IP-based services and applications that can be exchanged.

Unlike email which has a well-known addressing schema that only exists on the Internet (<user>@<domain>), some communication services like VoIP rely on telephone numbering schemas (as defined by the ITU-T Rec. E.164) to identify subscribers' service addresses. These numbering schemas are attached to the Public Switched Telephone Network (PSTN). Without IP or VoIP Service Peering, VoIP calls between operators are sent over PSTN, resulting in the use of a third party network. This incurs additional service costs, potentially degrades the perceived service quality (voice is transcoded multiple times) and prevents the deployment of enhanced VoIP services. Similarly, a video over IP call between subscribers residing on two different MSO networks would likely be sent to the PSTN and be degraded to an audio-only call.

One of the key benefits for peering IP-based Services is that it allows operators to "identify" Voice or Video over IP calls and exchange them end-to-end across IP networks, preserving value-added services and advanced features for the benefit of subscribers.

It is worth noting that the notion of exchanging VoIP traffic between providers has been explored since the early days of IP telephony when toll bypass and international long distance arbitrage was seen as the main economic driver for the emerging service providers. A commonly used name borrowed from the financial field emerged: "VoIP Clearinghouse", which is a third party clearing center where VoIP providers could exchange minutes at lower cost

than the PSTN through the use of IP termination points. The motivations of the VoIP clearinghouse model are different than those of the MSO community. The goal of the clearinghouse was low-cost termination of VoIP calls to the PSTN, while the main goal of the MSO community is to exchange VoIP call with feature transparency and advanced value added services like end-to-end video communications between MSOs.

In order to understand the various network functions involved in VoIP Service Peering, key phases in the establishment of an IP communication session were analyzed: from the session initiation (a VoIP number or service address identifier is entered by the caller) to the session establishment (the caller’s device exchanges IP media traffic with the called party’s terminal).

Several questions emerged as a result of the analysis:

- How does the caller or the caller’s MSO operator know that the called party is on a peering partner’s network?
- How can the called party be reached using an E.164 addressing schema in a network based on IP addresses?
- Knowing the called party’s VoIP addressing schema, where should the VoIP call be routed? And to what network device should the VoIP signaling session be sent?
- What signaling protocol(s) should be used to initiate the session to the peering partner?
- How will QoS be preserved once the communication session reaches the “other” transport network?

2.3 VOIP PEERING LAYERED APPROACH

From a cable operator point of view, the questions posed in the previous section can be summarized as: how can an operator discover that a particular user has subscribed to a cable service (Service Discovery), locate its service address (Service Location), understand where to signal the IP session on the other cable network (Addressing and Signaling), and how to guarantee better transport of the real-time IP communication services (Transport). Figure 1 provides a graphical representation of the various IP Service Peering layers.

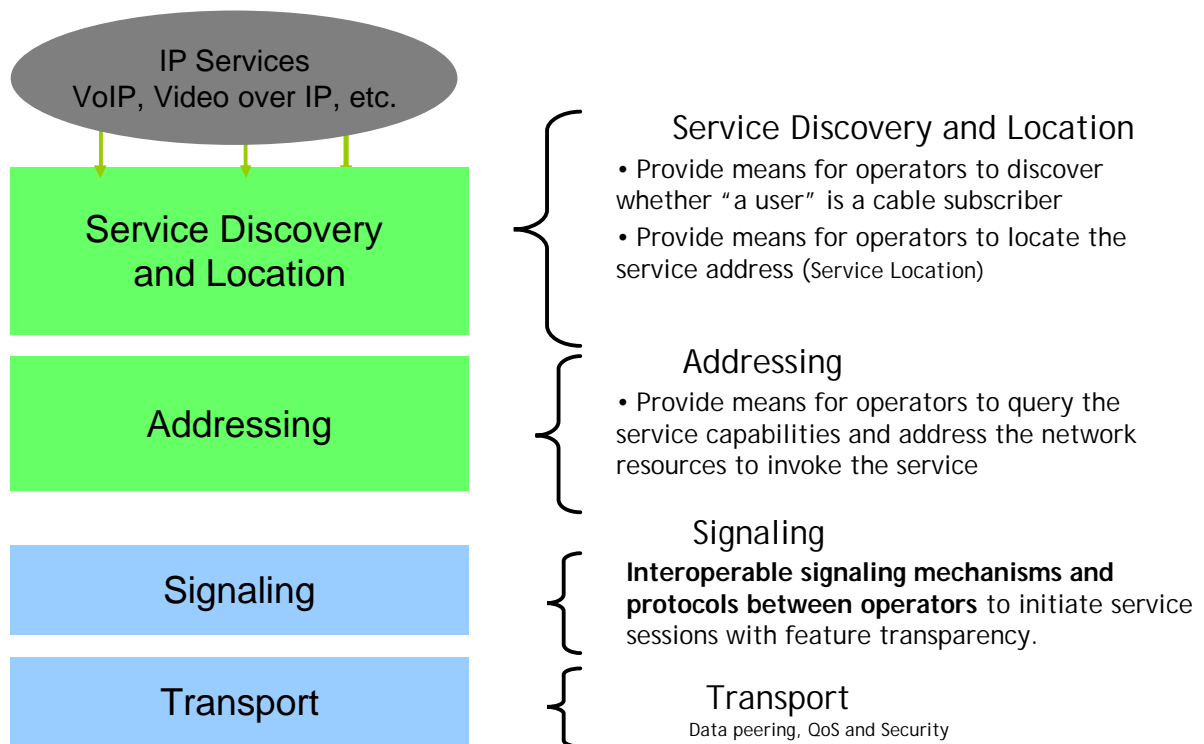


Figure 1 - A layered representation of IP Service Peering

While MSOs deploying VoIP services have to provide IP transport and signaling mechanisms to establish the IP session, the peering of such services adds two potentially “new” functions: Service Discovery-Location and Addressing between operators.

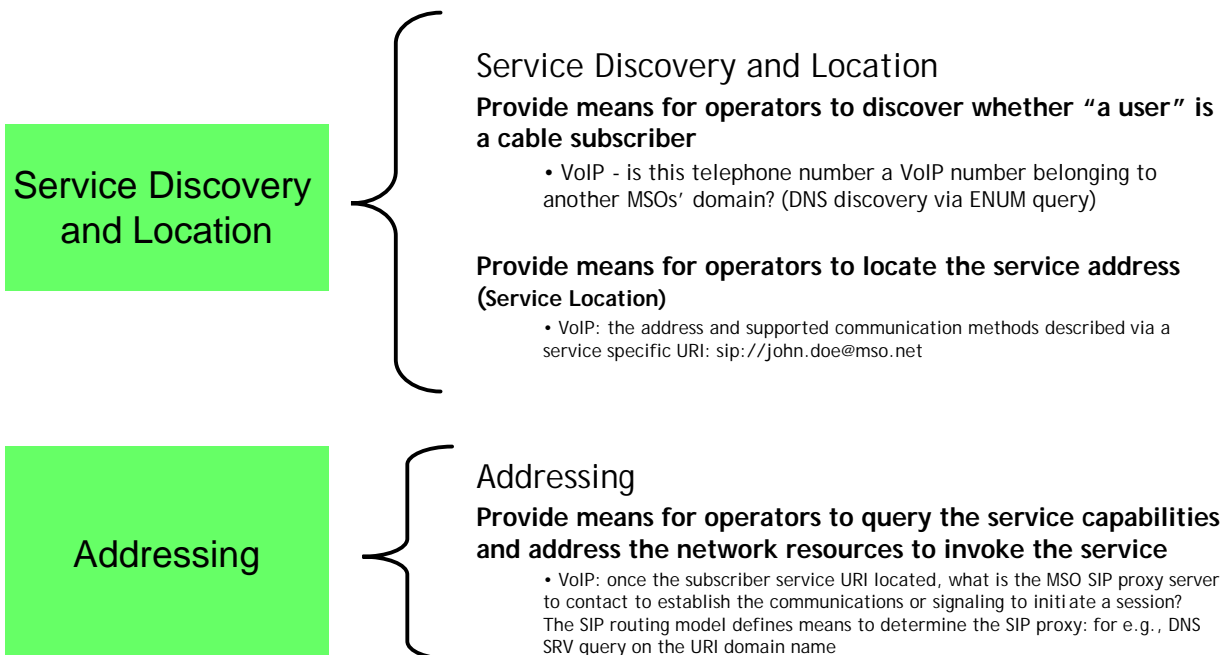


Figure 2 – Service Discovery, Location and Addressing Functions

2.4 HIGH-LEVEL ARCHITECTURE

A high-level architecture for the peering of IP communication services is shown in Figure 3. This reference architecture was developed as part of the CableLabs peering initiative and represents the collective views of the CableLabs members participating in this project. Some MSOs may also have an ENUM infrastructure in place.

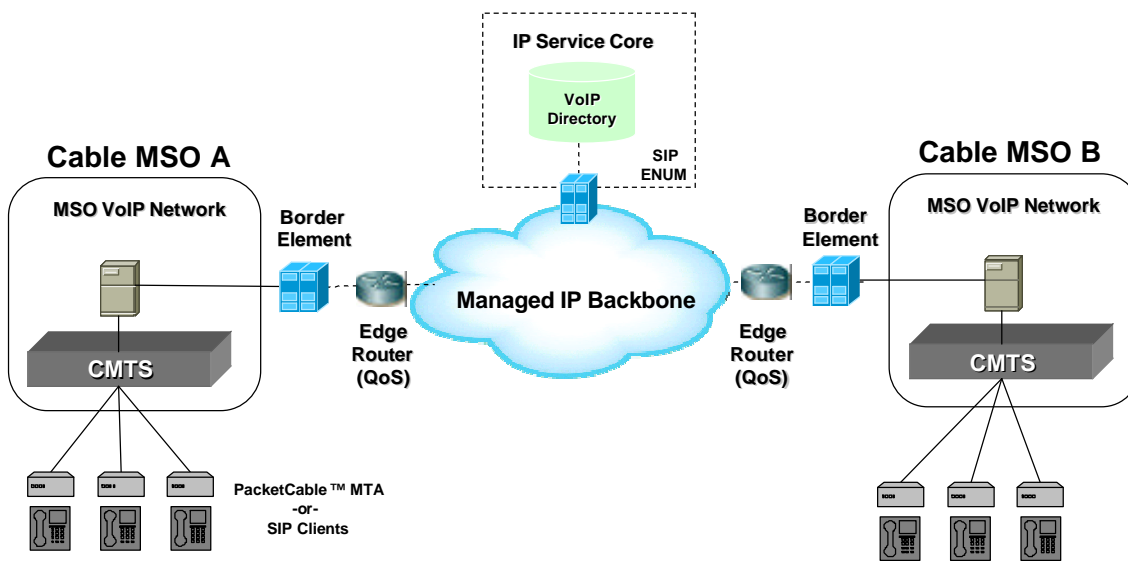


Figure 3 - VoIP Peering Architecture

The VoIP Service Peering architecture contains a few functional components necessary for the peering of IP based services. In Figure 3, the cable MSO networks are the service domains providing the VoIP Service to the subscribers (digital voice or video over IP). To link these networks together, and to facilitate end-to-end IP communications, the IP Service Core domain is identified as a “third-party” network domain providing some of the discovery, location and addressing service functions described in 2.3.

Several functional components play key roles in the VoIP Service Peering architecture, including:

- **Border Elements**

It is assumed that each service domain has deployed an IP Service architecture offering boundary components that connect the internal IP Service domain to its peering partners. Border Elements are common components in many IP Service network architectures - from email (inbound SMTP proxy servers accessible to the “outside Internet world”) to web services (HTTP proxies) and VoIP (inbound SIP proxy servers).

For the application of this architecture framework to VoIP peering, the Border Element should, at a minimum, act as a VoIP signaling entity that may provide outbound or inbound SIP signaling connectivity and SIP protocol profile normalization with the other MSO peers. The Border Element should also support the IETF ENUM protocol for translating a telephone number into URIs or DNS records. The Border Element may also perform media transcoding or proxy functions (out of scope at this time).

- **Edge Routers**

Edge routers are the IP routers located at the boundary of the service domain. In the context of VoIP Service Peering, an Edge Router acts as a Quality of Service (QoS) element for DiffServ policing and (potentially) re-marking.

- **IP Service Core “VoIP Directory” and ENUM Servers**

The service discovery function is typically provided by a set of directory services that can map a subscriber service identifier into one or more URIs, which indicate the MSO providing service to the subscriber and potentially the service resources to contact to initiate IP communication. Examples of subscriber service identifiers include telephone numbers for VoIP service, user identifiers like username@domain for instant messaging, etc. In the case of VoIP, this service discovery function is performed by the “IP Service Core VoIP Directory”. The IP or VoIP Service Core VoIP directory utilizes various technologies (e.g. ENUM) for resolving telephone numbers to Internet style addresses. ENUM is the name of an IETF working group as well as the name of a DNS-based IETF RFC and DNS extensions to allow the mapping of telephone numbers to a set of URIs. ENUM is one protocol solution for the VoIP Directory to realize the service discovery function. An ENUM server is more or less the logical VoIP Directory function with ENUM access.

2.4.1 General Requirements

The VoIP Service Peering architecture should:

- allow MSOs to “link” their networks for numerous IP communication services,
- facilitate end-to-end VoIP traffic exchanges between MSOs,
- be extensible to allow third-party partners to take part in the peering infrastructure,
- not preclude any future integration of the MSO VoIP peering infrastructure with public or ‘carrier’ ENUM services, that may develop in the future,
- allow, or at least not preclude, a particular MSO to establish peering relationships with third party partners independently from the other MSOs,
- allow, or at least not preclude, a particular MSO to maintain its own ENUM servers (which may have a local copy of NAPTRs for other MSOs or may query a central private TLD maintained by a third party),

- allow two MSO peering partners to exchange VoIP traffic on a special sub-set of VoIP numbers if both parties desire to do so,
- address protocol requirements for VoIP signaling (SIP), QoS, provisioning, security and service discovery (ENUM).

2.5 RFI SCOPE AND OBJECTIVES

CableLabs is issuing this Request for Information (RFI) for the purpose of soliciting input on Cable's VoIP Peering initiative. Any interested party may respond. Interested parties may include hardware suppliers and software vendors, or other companies that may desire to offer part of or all of the solution set to develop a production-based VoIP peering infrastructure for use by MSOs.

Several service categories are considered as part of the VoIP peering project: VoIP interconnect between MSOs and selected service providers, IP service access to PSTN SS7 databases, extensions of IP Service Peering beyond VoIP (instant messaging, voice-video-multimedia traffic exchange, etc.).

Of particular interest are:

- Services or products that can enable end-to-end VoIP service peering between MSO members, and between MSOs and selected service providers,
- Services or products that can provide access to PSTN SS7 databases like Local Number Portability (LNP), 800 and CNAM via IP-based protocols such as ENUM and SIP,
- Services, methods or products for monitoring VoIP Service Level Agreements and providing service quality metrics for VoIP traffic exchange,
- Methods and products for Telephone Number (TN) to SIP URI ENUM provisioning, input on the various push and pull models for distributing and replicating TN-URI information.

The following sections contain a list of questions that should be considered when responding to the RFI. Section 3 defines the format for RFI responses.

2.6 TECHNICAL RESPONSE QUESTIONNAIRE

The preceding sections of this document have articulated the vision of the CableLabs VoIP Peering initiative. An inventory of technical capabilities and key functions necessary to support these service categories has been proposed. Based on the information presented, please consider in your RFI response the following questions related to the service vision and technical aspects of this initiative.

2.6.1 Cable VoIP Peering Service Vision

- Identify any additional strategic initiatives, service capabilities, service categories, scenarios and features that you feel should be included in the scope of this effort.
- Provide a list of IP-based or SIP-based real-time communication services that this infrastructure could enable in the short and long term.
- Specify how this infrastructure could be extended to support these real-time IP communication services.
- Identify any core technical capabilities or functions that should be considered as part of the VoIP Peering service infrastructure.
- Describe the various service models that could be used to realize this VoIP peering infrastructure between MSOs and between MSOs and selected VoIP providers (distributed or centralized models, service modules that could be operated by other third-party service providers, etc.).
- Define how such an infrastructure could facilitate fixed-mobile service convergence and describe any associated service scenarios.
- Describe how the infrastructure should be designed to best adapt to evolving regulatory requirements and public ENUM services.

2.6.2 VoIP Peering Architecture

- Describe a complete architecture that meets the general requirements stated in the previous sections.
- Provide high-level network diagrams of your proposed VoIP Peering architecture(s) and define key functional elements.
- For hardware and software vendors, identify specific product names and software/hardware releases that implement your proposed functional elements or solution; if some required features are planned for future releases, please indicate their availability.
- For service providers, based on your proposed architecture(s), describe the services you would provide to MSOs and identify the sub-set of services that you would not provide (the complement to your service solution to meet the general requirements).
- For service providers, describe whether your company intends to submit a bid for the future CC1 ENUM LLC Tier 1 service.

2.6.3 Protocols requirements

- Describe the key protocols requirements needed to perform VoIP peering at all levels (signaling, bearer, service and element provisioning & management, etc.) between VoIP service providers.
- Describe the role the following protocols play in your recommended architecture, and detail any additional protocols used:
 - IETF ENUM (RFC 3761)
 - IETF Session Initiation Protocol (SIP) (RFC 3261)
 - IETF Extensible Provisioning Protocol (EPP) (RFC 3731 and 4114)
- Describe in details your support of ENUM and its extensions, SIP and its extensions, and EPP and its extensions.
- ENUM – Do your products or services allow for multiple ENUM DNS roots? Do your products support multiple DNS server entries: some for ENUM DNS resolution, some for other DNS

queries? Do you have any recommendations for the selection of the cable ENUM root (Public or Private domain, Top Level Domain, 1st or 2nd level Private Domain)?

- ENUM – Describe how the cable ENUM infrastructure should be designed with respect to private and public ENUM in order to guarantee integration with the future public ENUM service.
- ENUM – Provide details for how your solution would allow the cable operators to define and enforce access control rights for other partners to have read and/or read-write access to all levels of the private ENUM DNS infrastructure.
- ENUM – Various approaches can be adopted for building a VoIP TN-to-SIP URI DNS infrastructure or “directory”. At least three baseline options are available for Telephone Number (TN) to URI resolution:
 - ENUM Service Core resolves e164 TN → SIP URI
e.g. 12125551212 → sip:12125551212@msot.net
 - ENUM Service Core resolves e164 TN → target MSOt ENUM DNS server(s)
e.g. 12125551212 → DNS server: enum.msot.net
and then an NAPTR DNS query to enum.msot.net → SIP URI
 - ENUM Service Core resolves e164 TN → Service Provider ID (SPID) that allows the request originator to associate the SPID with either a SIP URI or a DNS server based on a pre-established relationship with the operator.

List the criteria that should be taken into account when making a decision on the preferred option and describe the pros and cons of each approach.

Describe whether your product or service would allow each operator to determine its preference and direct the approach independently for the TNs it owns.

- ENUM – Describe your recommended ENUM functional architecture including DNS hierarchy, DNS tree structure and levels to meet the general requirements defined above and the operational needs of the MSOs. Describe how DNS zone data generation and propagation should be managed.
- ENUM – Describe how DNS caching should be designed at all levels of the ENUM functional architecture, from products implementing ENUM clients to the various levels of the DNS servers in the ENUM hierarchy.
- ENUM – Please indicate your detailed product compliance with IETF RFC 3761.
- ENUM – Please indicate your detailed product compliance with Extension Mechanisms for DNS EDNS0 - IETF RFC 2671.
- ENUM – Describe relevant Enumservice types, including those defined in IETF Internet-Draft form, that should be used in the context of VoIP peering and indicate your product compliance.
- ENUM/SIP – Please indicate the preferred Uniform Resource Identifier (URI) format that should be supported (SIP, tel, mailto, etc.) and the one you recommend to be used between MSOs and why.
- SIP – Please indicate your detailed product compliance with the IETF RFC 3261 and other IETF SIP RFCs.
- SIP – Describe relevant SIP extensions that should be used in the context of VoIP peering to meet specific end-to-end service requirements between operators and indicate your product compliance
- SIP - Given a SIP URI, describe what dynamic mechanisms your products or service support to locate the appropriate serving SIP entities
- Define how peering partners at layer 3 should enhance their peering relationships to differentiate voice from data packets at both the signaling and bearer levels? What QoS mechanisms or protocols should be used between providers to allow the VoIP service peering infrastructure to provide better QoS to voice packets?
- List the security requirements and protocol mechanisms that should be carefully considered to ensure both the privacy and confidentiality of the subscriber data, and the protection of the service providers participating in the VoIP peering exchanges.
 - If ENUM is used to resolve E.164 addresses to service URIs, what recommendations do you have to secure those exchanges between the VoIP providers, or between the VoIP providers and a third-party service partner providing ENUM-like services (through private or public ENUM)?
 - What recommendations would you provide to secure SIP (IETF RFC 3261) signaling

between VoIP providers?

- Describe how to secure all the protocol 'interfaces' described in your proposed solution(s).
- Describe a scalable model for each MSO to provision Telephone Numbers (TNs) into the VoIP Service infrastructure and the mechanisms that may be employed to ensure accurate TN ownership. Indicate your product or service capabilities for managing large databases of partitioned blocks of Telephone Numbers and its provisioning interfaces.
 - Describe whether your solution supports individual TN provisioning, or bulk provisioning, or both.
 - Describe what provisioning protocols and file formats you support (e.g. HTTP, FTP, XML, EPP, etc.).

2.6.4 Product Capabilities

- Describe each product or service component that could be used in the VoIP Peering architecture, and provide the detailed product capabilities, protocol support and its design guidelines around performance and scale.
- Describe complementary products that may help increase the overall service scalability, redundancy or functionality.

2.6.5 Hardware Platform Requirements

- Describe the hardware platform characteristics (unit size, AC/DC powering options, rack mountable, etc.).
- Provide details of NEBS Certification. If the product is not NEBS certified, please define what partial areas are certified and what prevents overall certification.

2.6.6 Performance considerations

- Describe the product or service architecture's performance characteristics and how redundant or resilient the system or services are.
- List your product or service performance results for all protocols and L2 interface cards.
- Provide any considerations on geographic diversity capabilities.

2.6.7 Operations and Management

- For service providers, what steps are to be taken to ensure the end-user privacy and overall confidentiality of the information provided by your solution?
Specifically, if MSOs provision data into a system that you manage, please describe (1) how that data is secured, (2) your company policies against re-using or re-selling that data, (3) information regarding your neutrality as a third-party data manager, and (4) any relevant certifications, processes, or programs related to these questions.
- For service providers, describe how your systems are designed to deal with the security requirements listed above.
- For service providers, describe how your company measures service availability and provide the technical level(s) of guarantees your company is able to provide.
- For service providers, describe what reporting processes are in place for all aspects of the VoIP peering solution you propose. Provide detailed examples and sample reports.
- Do you have any ability to provide access to other PSTN databases such as LNP, 800, CNAM, etc., as part of the solution you recommend?
- What product or service features do you support or offer to enable MSOs to verify the status of a particular network element, overall service health, or to monitor call, query, or signaling status between two MSOs?

2.6.8 Staffing

- For service providers, estimate staffing required in terms of operation and management requirements, stating your assumptions on the number of participating MSOs, size of VoIP

- subscriber base, number of ENUM and SIP border elements, etc.
- Supply job description for personnel required to run it and quantify the number of positions in each category.

2.7 SALES INFORMATION: TERMS AND CONDITIONS AND PRICING

Responses to the following are to be sent only to these CableLabs' members at the following addresses and not to CableLabs:

Adelphia

5619 DTC Parkway
Englewood, CO 80111
Attention: Roy Perry
Director of VoIP
Roy.perry@adelphia.com

Advance/Newhouse Communications

5000 Campuswood drive
E. Syracuse, NY 13057-1254
Attention: Victor R. Blake
Director of Network Strategy and
Architecture
vrb@advancenewhouse.com

Buckeye

4818 Angola Road
Toledo, Ohio 43615
Attention: Doug Ward
Director - Network Operations
dward@buckeye-telesystem.com

Cable One

1314 N 3rd St, Floor
Phoenix, AZ 85004
Attention: James Hannon
VP Engineering
james.hannan@cableone.net

Cablevision Systems

1111 Stewart Avenue
Bethpage, NY 11714
Attention: Jack Burton
Director Systems Engineering
jsburton@cablevision.com

Charter Communications

6399 S. Fiddler's Green Circle, Sixth
Floor
Greenwood Village, CO 80111
Attention: Kevin Deibert
Senior Director – VoIP Engineering
Kevin.deibert@chartercom.com

Cogeco Cable Inc.

1, Place Ville-Marie
Suite 915
Montréal, Québec
H3B 2G2
Attention: Denis Chartier
Director-Multimedia and

Telecommunications
Denis.Chartier@cogeco.com

Comcast Cable

1500 Market Street
Philadelphia, PA 19102
Attention: Jason Livingood
Senior Director - Forward Looking
Communications Services
jason_livingood@cable.comcast.com

Cox Communications

1400 Lake Hearn Drive
Pavilion D, Floor
Atlanta, GA 30319
Attention: John Coppola
Mgr - DOCSIS Technology
John.coppola@cox.com

Insight Communications

302 Production
Ct. Louisville KY 40299 Attention: Jerry
Knights
VP Telephony Engineering
Knights.J@insight-com.com

Liberty Media

12300 Liberty Blvd.
Englewood, CO 80112
Attention: Tony Werner
EVP & CTO
tony@libertymedia.com

Liberty Global International

Boeing Avenue 53
1119 PE Schiphol-Rijk
74763 Amsterdam BT
The Netherlands
Attention: Mourad Veeneman
Director Next Generation Technologies
mveeneman@upcbroadband.com

Mediacom Communications Corporation

100 Crystal Run Road
Middletown, NY 10941
Attention: Joseph Selvage
Vice President IP Networks
jselvage@mediacomcc.com

Rogers Cable Communications

10 Dyas Rd
Don Mills, Ont M3B 1V5
Canada
Attention: George M Hart
Director, Technology Integration
george.hart@rci.rogers.com

Time Warner Cable

13241 Woodland Park Road
Herndon, VA 20171
Attention: Chris Williams
Principal Engineer for
Broadband Technology
chris.williams@twcable.com

2.7.1 Terms and Conditions

- Provide the terms and conditions that may apply based on your product or service proposals
- Provide Service Level Agreements including specified penalties

2.7.2 Pricing

- Provide your pricing, fees, taxes, and any other charges that may apply based on your product or service proposals
- For service providers (ENUM, SIP, IP-based access to SS7 databases), indicate your pricing structure and how it evolves as a function of the number of MSOs interconnected, number of geographical locations, number of end subscribers served by the infrastructure, etc.

SECTION 3

RFI RESPONSE REQUIREMENTS

3 RFI Response Requirements

This section defines the format that RFI responses must follow. CableLabs and its members would appreciate detailed responses with ample unbiased responses and technical considerations. Please include suitable diagrams wherever deemed appropriate.

Section 1: Vendor contacts (Mandatory)

Vendors are requested to provide the following contacts:

- Primary Contact – A general contact for the RFI response
- Technical Contact(s) – A list of technical experts for further follow-up, if applicable. Please indicate areas of expertise for each contact listed.

The following contact information should be provided for each contact: Name, Title, Department, Phone, Fax, Email, and Address

Section 2: Proposal Response (Mandatory)

Vendors are requested to present their responses to this RFI in this section. This section should address questions included in section 2.6. This section should also address items not covered in the RFI. This section must not exceed 15 pages. The Proposal Response must consist of two main sections:

- Section 2.1: Summary – Please limit the summary to two pages. Use the summary as an opportunity to highlight specific items that CableLabs and its members should focus on, and for which additional detail is included in the detailed response.
- Section 2.2: Detailed Response – A proposed architecture and detailed responses within the scope of this RFI are requested. Please include comments on the proposed strategic initiatives and features, as well as detailed input on the architecture capabilities, protocols, and standards that should be used to support the strategic initiatives. Please refrain from using this section to repeat previously presented/published material (Use appendices to include such presentations and reference such material in this section). CableLabs and its members would appreciate sufficient examples and technical due diligence to support any architectural or technical recommendations. Detailed advantages and disadvantages of various approaches are welcome. Examples of current usage of specific recommendations and/or links will be appreciated.

Appendix A: References to Standards/Specifications (Mandatory)

Any references to published standards and specifications (IETF, ITU etc) need to be referenced in this section. While not required, one may split the references into normative and informative sections.

Appendix B: References to vendor presentations/papers (Optional)

Any references to vendor specific presentations (Technical Papers, SCTE/NCTA presentations) may be included in this section.

Note: CableLabs requests that any references that are not publicly available should be included as attachments and referenced here. If the work involves patents or other copyrighted information please check with legal before proceedings with submissions and optionally document them in Appendix E.

Appendix C: Specific Standards/Working Group recommendations (Optional)

If there are recommendations regarding specific standards bodies (Ex: ITU, IETF) or technical specification groups CableLabs would request the contact information and/or briefing of such groups with specific contact information to be provided here.

If the vendor responding to this RFI is involved in any such recommended groups, we request such information to be presented here.

Appendix D: List of attachments (Mandatory only if attachments are included)

Any attachments that have been included need to be listed here. Appendix B may refer to such attachments.

Appendix E: Other information (Optional)

This section is reserved for any information that is not covered in appendices A through D or the General Response section. This includes any patent information that could be deemed useful, but cannot be disclosed or to report any potential patents in specific areas that the vendor wants to bring to CableLabs' attention.