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Washington, D.C. 20554

In the Matter of
Technology Transitions Policy Task Force

COMMENTS OF HYPERCUBE TELECOM, LLC

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EXECUTIVE SUMMARY

HyperCube Telecom, LLC (“HyperCube”) recommends that the Commission precede any trials of Internet Protocol (“IP”) interconnection with collaborative public workshops to address critical technical issues and to develop proposals for trial design. Absent careful preparation, the Commission will not be able to ensure that the trials produce valid data that will inform its policy making while preventing harm to the public and preserving a competitive marketplace. Incumbent local exchange carriers (“ILECs”) should not be permitted to unilaterally dictate the terms and conditions of the trials, which must be conducted within the framework of the statutory requirements of the Telecommunications Act of 1996, including the interconnection regime of Section 251 and 252.

Among the technical issues that should be addressed in industry workshops are the development of interconnection, call signaling, and database utilization “best practices.” Today’s practice for IP interconnection is largely ad hoc. The results are not uniform – interconnections usually work, sometimes with good signaling, sometimes without; sometimes dual-tone multi-frequency signaling (“DTMF”) works, but sometimes not very well. And fax capability is rarely tested until the receipt of end-user complaints. With respect to call signaling, HyperCube strongly recommends addition of the Jurisdiction Information Parameter (“JIP”) as a mandatory parameter in call detail messages for purposes of the trials to ensure call accountability and proper billing of IP as well as time division multiplexing (“TDM”) voice traffic. There should also be standard procedures for providers using Session Initiation Protocol (“SIP”) to update and use the databases necessary for accurate call routing and billing, and for transmission of Caller ID information the public depends upon.
With respect to trial design, it is necessary that workshops be used to consider the complex issues relating to determination of the appropriate experimental questions and use cases to be studied. There should be collaborative procedures for selecting trial sites and for ensuring broad trial participation, as well as for defining requirements for data collection, reporting, and evaluation.

HyperCube recommends that the Commission have two rounds of trials, with Tier One ILEC wire center trials in the first round, and rural ILEC trials in the second round. There should be an urban and a rural central office trial in each former Regional Bell Operating Company territory, with the central offices nominated by ILECs, and the public having an opportunity to propose alternative or supplemental offices. Trials may require at least a year, given their complexity, the broad array of services involved, and the significant consumer implications across that array of services. Any provider proposing the exchange of a volume of voice traffic equivalent to four T-1s should be entitled to receive direct IP-IP interconnection. ILECs should not be permitted to prescribe interconnection procedures or require use of their wholesale products to which the interconnecting carrier does not wish to subscribe. To protect the public, trials should be designed to be reversible. The trials should not be used by ILECs as a means of escaping from the statutory interconnection obligations, and before an ILEC trial proposal can be approved, the ILEC must demonstrate that its proposed IP interconnection arrangements and systems will comply with the requirements of the Section 271 competitive checklist.
In the Matter of

Technology Transitions Policy Task Force

COMMENTS OF HYPERCUBE TELECOM, LLC

HyperCube Telecom, LLC (“HyperCube”) files these comments in response to the Trials Public Notice\(^1\) of the Federal Communications Commission (“FCC” or “Commission”).\(^2\) HyperCube is a leading competitive local exchange carrier (“CLEC”) offering, among other services, wholesale intermediate services that allow the seamless transmission of communications between providers, regardless of their service offerings or the technologies they deploy.

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I. INTRODUCTION: INTEROPERABILITY OF THE NATION’S COMMUNICATIONS NETWORK REQUIRES TRIALS THAT ARE INSEPARABLE FROM THE TELECOMMUNICATIONS ACT AND BASED ON COLLABORATIVE STANDARDS.

The trials proposed by the FCC’s Technology Transitions Policy Task Force (“Task Force”) are intended to provide “data that will be helpful to the Commission in determining what policies are appropriate to promote investment and innovation while protecting consumers, promoting competition, and ensuring that emerging all-Internet Protocol (IP) networks remain resilient.” For the trials to produce valid data that address all four of these equally-important Commission concerns, the technology-agnostic interconnection rights and obligations of the Telecommunications Act must be the baseline for the trial environment. By using a

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3 Trials Public Notice at 1.


6 See National Association of Regulatory Utility Commissioners Federalism Task Force, Draft Report: Cooperative Federalism and Telecom in the 21st Century at 10 (June 2013) (Fourth Principle of Cooperative Federalism: “Interconnection: Communications networks must remain interconnected on a non-discriminatory basis regardless of technology. All users must be able to call each other regardless of carrier or technology, calls must complete, and no area of the country should become an isolated communications island, because some providers choose not to interconnect to others in those locations”). Cf. Remarks of Sean Lev, Acting Director Technology Transitions Policy Task Force, FCC, at TIA Network Transition Event (Jun. 21, 2013) (“Lev Remarks”) (multiple voice service choices now exist due to “massive private investment, and because of government policies that created and maintain the conditions necessary for competition to flourish, including rules to ensure interconnection. . . . It is not appropriate simply to assume that a change in network protocols or the deployment of new (footnote continued on next page)
collaborative, industry workshop approach to achieve consensus on critical technical standards and trial design, the Commission will help ensure that the resources invested in the trials produce useful data and promote the evolution to resilient all-IP networks without harming consumers or adversely affecting market competition.

II. DISCUSSION: TRIALS SHOULD FOLLOW THE ESTABLISHMENT OF FIRM STANDARDS AND PROCESSES, AND THEN FOCUS ON IP INTERCONNECTION TECHNICAL ISSUES AND ENSURING ADHERENCE TO CONGRESS’S MANDATE.

A. Collaborative Industry Workshops Should Precede Trials.

Numerous technical and procedural issues must be resolved before any trials begin. Such advance preparation is essential to ensure the protection of the public during the trials, and to preserve an open, competitive environment that will produce real-world data useful to the Commission in developing regulatory policy throughout the transition to all-IP networks. As physical infrastructure automatically results in increased competition or negates the need for an FCC role.”).

Cf. Letter from Matt W. Wood, Policy Director, Free Press, to Marlene H. Dortch, Secretary, FCC, GN Dkt. 13-5, et al. (April 12, 2013) at 1 – 2 (counseling “against the unwise approach of grant first, ask questions later,” and stating that the “Commission can and should answer the policy questions first, prior to conducting any technical trial.”).

Several organizations have already expressed particular concerns about the potential adverse impact on consumers of over-hasty elimination of traditional services. See, e.g., Letter from Edyael Casaperalta, Rural Broadband Policy Group Coordinator, to Marlene H. Dortch, Secretary, FCC, GN Dkt. 13-5, et al. (Jun. 27, 2013) (expressing concern, inter alia, that consumers could lose access to affordable telephone service and urging Commission to ensure that telephone companies do not discontinue landline “plain old telephone service,” “the most affordable, accessible, and reliable communications tool . . . in America,” and supporting competition in the telecommunications ecosystem). See also Comments of AARP, NYPSC Case No. 13-C-0197 (Jul. 1, 2013) (“AARP NY Comments”) (opposing the Verizon VoiceLink tariff as harmful to older Americans and to public safety because it is less reliable, and does not support DSL, or Life Alert or home security systems). HyperCube also recommends that the Commission set a goal for the trials of achieving voice quality services at or near the traditional P.01 grade level and that there be no relaxation of call disruption and call dropping standards from those currently applicable to, and relied on, by customers of traditional wireline services.
discussed below, HyperCube recommends that the Task Force convene industry workshops to adopt “best practices” that fill existing voids in industry standards and facilitate effective IP interconnection across disparate platforms and technologies\(^9\) in the mixed time division multiplexing (“TDM”) - IP operating environment that will continue for some time. In addition to suggesting specific technical standards for consideration in such workshops, HyperCube supports use of public workshops also to define the specific issues to be considered during the trials and to design appropriate methodologies for the experiments addressing those issues.

**B. Collaborative Development of Key Standards is Necessary Before Trials’ Start.**

The trials represent an opportunity to revive stalled industry efforts to achieve consensus with respect to best industry practices for signaling protocols. Similarly, there is a need for standardization of database utilization that will be appropriate in an IP environment. Without effective call detail, routing, and network information, it will not be possible to assure consumers they will continue to receive telecommunications services of the highest quality throughout the transition from TDM to IP networks.

The Commission has already recognized the benefits of conducting industry workshops to further the work of the Task Force.\(^{10}\) This is equally appropriate with respect to ensuring

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\(^{10}\) *See, e.g.*, *Lev Remarks*; Letter from Claude Aiken, Office of General Counsel, FCC, to Marlene H. Dortch, Secretary, FCC, GN Dkt. 13-5, *et al.* (Apr. 12, 2013) (transmitting proceedings of the first workshop held Mar. 18, 2013, for the public record); *see also* Letter from Richard Shockey, Shockey Consulting, to Marlene H. Dortch, Secretary, FCC, GN Dkt. 13-5 (footnote continued on next page)
adequate preparation for the IP trials, particularly with respect to establishing standards for call signaling and database utilization. Absent such standardization, the IP trials will not achieve their potential for providing conclusive data that will be useful in establishing permanent standards and practices for IP interconnection. Moreover, without such preliminary industry standardization, there is far greater likelihood that consumers will experience disruptions in call flows and will be adversely affected by the on-going trials. By convening a workshop, the Commission can ensure completion of the industry work that has already advanced to a near-final stage. Regardless of the arrangements that may exist between two parties using IP-IP interconnection at a trial CO, third party providers and other technologies will be involved in call completion and billing for a large proportion of calls. Absent standard requirements for call signaling and database use, calls may be misrouted or will contain inaccurate origination information that will lead to inaccurate call rating, and phantom traffic, and consumers and third party carriers will be harmed.

To date, there has been little momentum for establishing or finalizing well thought-out and competitively-neutral standards and processes for IP interconnections. Instead, the processes for signaling, call quality, and call completion have been left to the ad hoc decisions of the parties to such interconnections. This has the potential to produce bad consumer experiences due to mishandled calls, false signaling, and even DTMF or facsimile transmission issues across these ad hoc interconnections. The scope of these trials should begin with an industry group to identify the use cases and the results which will make those cases successful. No single carrier

(filed Jan. 16, 2013) at 2 ("Shockey Ex Parte"). Mr. Shockey also supports a broad-based workshop approach to resolving technical issues raised by SIP interconnection.
should be permitted to dictate test criteria based on its own self-interest. Rather the industry itself, as a whole through representative participation, should decide.

HyperCube therefore urges the Task Force to convene an industry workshop to accelerate development of appropriate IP-based best practices that may be field-tested during the trials, and to assist the Commission in resolving the numerous other experimental design issues. This is a case where a little advance planning can achieve substantial gains in the utility of the trials while minimizing their possible adverse consequences. Once standards are widely accepted, it is a relatively simple matter to implement them for purposes of the trials, and the wider availability of improved information will also have positive results for the general environment outside the trials. Moreover, although voluntary, trial participation across industry segments is crucial to the long-term interoperability of the Nation’s communications network and should be facilitated by the Commission through such standards-development workshops.

HyperCube therefore urges the Commission to convene industry workshops to, at a minimum, more fully address call signaling, call quality, call routing, and database utilization issues. Preliminary proposals produced by the workshops should then be circulated for public comment, with the Commission basing its decision as to the final standards to be implemented during the trials on the input that it received through this public process. By giving potential participants six months’ notice through the workshops, the Commission can be assured that all those potentially affected by the standards will have an adequate opportunity to develop and present their positions. The workshops on signaling and database issues themselves should require little time, perhaps only days, with the resulting proposals subject to public review and comment before the Commission issues its decision.
Coments of HyperCube Telecom, LLC  
GN Dkt. 13-5

1. Consensus Needed as to Mandatory Call Signaling/Call Detail Parameters,  
Including Mandatory Use of the JIP

As it has in several earlier filings, HyperCube here endorses population of the JIP in all call signaling messages to improve call accountability, and billing, and in some cases routing, by allowing downstream providers to identify the original jurisdiction and carrier. While an optional parameter at this time, the JIP has regularly been used by carriers to indicate the true originating location of a call. Particularly with respect to 8YY calls and emerging calling services such as Skype-Out that are known to populate hundreds of calls with the same CPN and CN information, more information is needed to identify and bill the original PSTN carrier or

11 See, e.g., Comments of HyperCube Telecom, LLC, WC Dkt. 10-90, et al. (Apr. 1, 2011) at 12, 21.

12 The “[JIP] is a six-digit parameter in the SS7 ISUP Initial Address Messages (“IAMs”) used to convey information about call origin, as defined in the industry standard ATIS-PP-1000113.2005, Signaling System No. 7 (SS7) - Integrated Services Digital Network (ISDN) User Part (Revision of T1.113-2000).” See Letter from Thomas Goode, Associate General Counsel, Alliance for Telecommunications Industry Solutions (“ATIS”) Network Interconnection Interoperability Forum, to Marlene H. Dortch, Secretary, FCC, CC Dkt. 01-92 (Feb. 10, 2006) (“ATIS Ex Parte”). See also ATIS, ATIS-0300011, Next Generation Interconnection Interoperability (NGIIF) Reference Document, Part III, Installation and Maintenance Responsibilities for SS7 Links and Trunks, Version 12.0 (2011) (“ATIS-0300011”).

13 The JIP is provider-specific, and it also includes some originating jurisdiction information data (the applicable Local Routing Number (“LRN”) of the originating carrier’s end-office, indicating the geographic location of the originating caller or switch, and, by look-up, the original public switched telephone network (“PSTN”) carrier). While the JIP is not sufficiently specific to provide complete geographical information for resolving all types of jurisdictional issues, it does provide information sufficient to identify the nature of the originating provider, reducing the number of issues in dispute. Moreover, the JIP is populated as soon as the call touches the PSTN, enabling any intermediate or terminating carrier to identify the provider by reverse engineering or LRN dip. The JIP for wireless carriers is tied to a Mobile Switching Center (“MSC”) that may cover multiple LATAs, MTAs, or local calling areas, so it would not necessarily be dispositive of the applicable charging regime, but it would indicate that the traffic originated on a mobile phone using a carrier-specific MSC. MSCs are, moreover, partitioned by market, so the JIP code does provide additional geographic information.
provider appropriately, as well as to hold providers accountable for any fraudulent activity emanating from their networks.

The JIP code is now an element of both SS7 signaling Initial Address Messages (“IAMs”) and Session Initiation Protocol (“SIP”) “INVITE” messages, and providers should be required to pass it to subsequent carriers in the call path. At this time, however, SIP “INVITE” messages lack this information unless the RFC 5503 or similar methodology is used, and such use has been rare. Because providers using both SS7- and SIP-based systems can all provide the JIP code, use of this parameter will result in far fewer instances in which call records contain incomplete or inaccurate origination information and are subsequently incorrectly rated. Furthermore, identifying the true originating carrier can be a long, drawn out “swimming upstream” process unless the signaling provides this information as the call is carried forward.

Standardization work on the JIP is virtually complete. Not only are the TDM standards for its use in SS7 signaling of long-standing, but issues concerning population of the JIP for wireless traffic and for SIP traffic were from a technical perspective resolved in 2003 for TDM and 2009 for SIP. While there has already been such substantial work in this area, and preliminary standards have already been widely published and available for years, industry


15 See PowerPoint: Proposed Solution – Wireless JIP Assignment Billing Committee Proposal, [Ordering and Billing Forum] Issues 2308/2349 available at http://www.docstoc.com/docs/99705663/Issue-Call-Flow-Example (“If the JIP cannot be populated at the state and LATA level, the JIP should be populated with an NPA-NXX specific to the originating switch or MSC where it is technically feasible.”).
efforts to achieve final consensus have nonetheless stalled. This has been in part due to decisions by the largest carriers, including AT&T, to limit their participation in standardization activities. Resource commitment and allocation for standardization efforts, particularly by large carriers that are advantaged by their ability to impose their preferred approaches on the rest of the industry, has been particularly limited in the SIP world.

Nonetheless, implementation of the JIP is already wide-spread.\footnote{See, e.g., USF/ICC Transformation Order at ¶¶ 724 and n.1253 (quoting XO Section XV Comments at 33 as stating “pursuant to agreements already in place, some carriers are currently exchanging VoIP traffic via local interconnection trunks and populating the [JIP] field on the call record to designate the traffic as VoIP traffic”).} Switches installed in the past 15 years, at least, are JIP-capable, and all soft-switches that would be used for IP interconnection are JIP-capable. Intermediate carriers such as HyperCube have negotiated use of the JIP by contract, and many carriers such as AT&T and Verizon mandate its use.\footnote{See, e.g., Verizon Notice Letter, Re: Jurisdiction Development Utilizing Jurisdictional Identification Parameter (JIP), www22.verizon.com/regulatory/files/SWA__JIP_011206.pdf (Jan. 12, 2006).}

Also, pursuant to industry “best practices,” intermediate carriers regularly populate this field with information obtained from upstream providers\footnote{Current industry recommendations instruct intermediate carriers to populate the JIP field if it is not already included in transmissions from initiating carriers. This may be done through customer-provided information, LRN data dips, reverse engineering of trunk groups, or, to the extent call-specific data is unavailable, by use of factoring. See the ATIS “Rules for Populating JIP, Rule 5” (“Where the originating switch cannot signal JIP it is desirable that the subsequent switch in the call path populate the JIP using a data fill default associated with the incoming route. The value of the data fill item is an NPA-NXX associated with the originating switch or MSC and reflects its location.”). The ATIS standard was initially issued in 2001 and has been revised several times. See ATIS Ex Parte at Attachment (ATIS Rules for Populating JIP).} in order to satisfy ATIS-300011 and to aid the industry as a whole in determining the originating information (jurisdiction, originating carrier, etc.). HyperCube, for example, by contract with its customers and pursuant to inter-
carrier agreements with other providers routinely populates the JIP with jurisdictional information. The JIP has also been used to ensure proper routing of emergency calls intended for poison control centers,\(^{19}\) as well as for addressing responsibilities associated with the implementation of such regulatory obligations as LNP and the Communications Assistance to Law Enforcement Act. In many cases, even when the originating information is not transmitted by upstream providers, HyperCube is able to populate the JIP parameter based on information HyperCube has about the call, and thus it is able to provide downstream providers with the additional information they need to accurately bill for a call. Such use of the JIP has been endorsed before the Commission by other commenting parties,\(^{20}\) and by industry groups. There is also industry consensus on use of the JIP for transmission of originating information.\(^{21}\)

At this time, however, because population of the JIP is not mandatory, a number of providers do not populate it. Some cite technical reasons, but many simply do not want the call originating location disclosed by use of the JIP because revealing the jurisdictional origin of traffic will increase call-origination accountability and thereby increase the provider’s costs.

\(^{19}\) In response to a request from a large wireless customer for a solution that would route calls originated on wireless phones to the proper poison control center, HyperCube pioneered the use of JIP to provide the necessary routing information, since the JIP is MSC-specific, and provides the location where a call first accesses the PSTN.

\(^{20}\) AT&T itself has advocated use of the JIP. Illinois Commerce Commission, *SprintCom, Inc., Wireless Co., L.P. NPCR, Inc. d/b/a Nextel Partners and Nextel West Corp.*, *Arbitration Decision*, Dkt. 12-0550 (Jun. 26, 2013) at 62 – 63 (“ICC Decision”) (resolving decision on Issue 39(d) by adopting AT&T’s proposal to require use of the JIP in call records to provide jurisdictional information about calls). While the Illinois Commerce Commission (“ICC”) recognized that ATIS has not yet completed work relating to use of the JIP, the ICC found the JIP to be the best available means of providing jurisdictional information.

\(^{21}\) See *ATIS-0300011; RFC 5503*. Issue 2308 (“Recording and Signaling Changes Required to Support Billing”), which would require use of the JIP, is currently pending before the ATIS OBF.
While the Commission declined to adopt a requirement to add the JIP to the mandatory call signaling information when it modified its call signaling requirements to address phantom traffic concerns, it refrained in part because industry consensus had not yet been achieved. There has since been no follow-up work to achieve this consensus. There is no reason, however, not to require the JIP’s use, particularly in the context of IP-interconnection trials where participation is voluntary. As reflected in previous filings before the Commission, and as recently as the end of last month, state commissions have already required its use. Recently, in arbitrating an interconnection agreement between Sprint and AT&T, as advocated by AT&T, the Illinois Commerce Commission required use of the JIP for purposes of determining the jurisdictional nature of traffic because no better means existed.

Thus, little work remains other than agreement to make the parameter mandatory. In the past, when the Commission has made formerly-optional parameters mandatory, industry has complied. The record of discussions regarding the JIP before the Commission dates back to at least 2006. Trial participants will only have to agree to implement RFC 5503 (or an equivalent methodology) to implement the JIP requirement, and usually this can be accomplished with minimal expense as most modern soft switches support the JIP. For the IP interconnection trials, making use of the JIP mandatory should be non-controversial, and it is in the public interest.

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22 USF/ICC Transformation Order at ¶ 278.

23 See, e.g., Letter from Mary McManus, Comcast Corp., to Marlene H. Dortch, Secretary, FCC, WC Dkt. 08-56 (Feb. 3, 2009) (attaching an order from the Vermont Public Service Board affirming a Proposal for Decision concluding Comcast is a telecommunications carrier and including proposed language requiring Comcast to provide call detail records including the JIP for traffic terminated over VTEL's network) Attachment at ¶ 49.

24 ICC Decision at 62 – 63 (resolving decision on Issue 39(d) by adopting AT&T’s proposal to require use of the JIP in call records to provide jurisdictional information about calls).

25 See ATIS Ex Parte.
This is particularly true because SIP messages so frequently lack information about the originating provider or originating location of a call. Because of this, it is difficult, if not impossible, for downstream carriers to include accurate call information as they route calls, and call-billing accuracy suffers. Requiring population of the JIP in SIP messages, regardless of the technologies used, will make it possible to quickly resolve call completion issues since any provider in the call path will know the originating carrier, and the accuracy of billing records will improve. Further, the additional call accountability will help identify the origin of fraudulent traffic. HyperCube therefore urges the Commission to include on a workshop agenda making population of the JIP parameter mandatory for purposes of the IP interconnection trials.

2. Consensus Needed as to Database Utilization Practices and Procedures

In addition to agreeing on standards that ensure adequate signaling information is transmitted between providers, regardless of the native type of their traffic, it is also necessary to establish standards for the use of industry databases regardless of technology platforms. Absent such standardization, both call flows and intercarrier compensation will be compromised. Moreover, consumers will be deprived of accurate Caller ID information on which they have come to depend, resulting in missed or unanswered calls, or inability to block unwanted calls.

As in the case of call signaling, while database usage standards are well-established in the TDM environment, there are no standards and obligations with respect to the SIP environment. If the Commission wants to explore whether IP interconnection results in voice calling experiences equivalent to those the public has traditionally received in the TDM environment, and to protect the public during the trials, then the trials should specify required participant
standards and procedures for updating and querying databases\textsuperscript{26} so that the information other providers and the public require is available for all.

Prompt updating of the LIDB is essential for providers to validate alternately billed calls, match phone numbers to local service providers, and retrieve billing name and address information, as well as for the provision of advanced data-centric services. In addition to keeping the local number portability LNP database updated when telephone numbers are ported, it is critical that the multiple “CNAM” (caller name) databases\textsuperscript{27} be current in order for Caller ID information to be accurate. Unless service providers can obtain line record and NPA-NXX information to be used with the LIDB, they will be unable to accurately provide Caller ID with Name service. CNAM and reverse look-up systems, however, have no standardization in the SIP ecosystem. While the SIP messaging does contain calling party information, it is easily obscured or spoofed, which has led to a cottage industry of bad actors able to mislead consumers in clear disregard of the Truth in Caller ID Act of 2009.\textsuperscript{28} CNAM and the reverse lookup of phone numbers is quickly becoming a tool to combat this, but its adoption is slow as the technology is still in its infancy.

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\textsuperscript{26} See Shockey \textit{Ex Parte} at 2 (presentation to Commission staff highlighted need to address the software databases essential to call routing, such as the LERG\textsuperscript{TM} Routing Guide, the Line Information Database (“LIDB”), the Number Portability Administration Center number portability database, and the 800/SMS database and also advocated a workshop approach).

\textsuperscript{27} There are multiple optional CNAM databases available to SIP providers, for example, but there are no standards requiring providers to obtain relevant information and upload it at reasonable intervals. While Caller ID information is often missing for incoming calls, it is even more likely to be omitted for outgoing calls.

It is also essential that the Telcordia LERG routing guide be up-to-date with network change information in order for calls to be directed to the proper service providers.\textsuperscript{29} LERG routing must continue to be maintained as a fallback, even as the industry experiments with non-LERG routing practices (ENUM, casually-passed CSV files, \textit{etc.}).

Before the trials begin, it is therefore essential that the Task Force standardize the obligations of participants to keep the database information current, determine which parties will be responsible for database updating, and ensure that all providers have equitable access to the necessary information. As in the case of the call signaling information, a workshop in which all interested parties may participate may be the best option for ensuring the development of standards and procedures for database use to govern the trials.

3. \textit{Consensus Needed as to Use Cases, Benchmarks, and Measurement of Success}

As with any experiments intended to produce valid and useful data, the trials require careful advance planning and experiment design. The Task Force and the Commission must identify the use cases and the questions to be answered by the trials, determine the data to be collected, design the trial methodology so as to produce useful information while minimizing disruption of consumer calling\textsuperscript{30} during the trials, and develop an evaluation instrument.

As an example, one trial could be intended to determine whether it is technically feasible for IP interconnection to achieve seamless interconnection of all traffic exchanged in IP format (both native and non-native IP traffic), with all providers being able to exchange traffic with all

\textsuperscript{29} The LERG includes such information as Operating Company Numbers ("OCNs"), Company Names ("CNs"), Country Code Assignments, NPAs (\textit{i.e.,} Area Codes), LATAs, NPA and NXX destination codes, V\&H Coordinates and other information for rate centers, LRNs, etc. \textit{See} Telecordia, Catalog of Products and Services (2011), available at http://www.trainfo.com/products_services/tra/downloads/tra_catalog.pdf.

\textsuperscript{30} \textit{See} Trials Public Notice at 3.
other providers in an open, competitive environment, and with customers receiving high quality voice service at or near the traditional P.01 standard. While interconnection standards are well-established for the TDM environment, there has been no consensus on IP-based interconnection standards. Once the technical standards to be implemented are established, the Commission must still resolve questions about trial design.

Given the range of complex issues needing pre-trial resolution, the Commission would benefit from public-participation workshops on the design of the trials themselves. Sessions should address the issues to be explored; selection of trial locations; trial participation; duration of the trials; data collection, reporting, and evaluation; and protection of the public during and following the trials. As in the case of proposals resulting from industry standards workshops, trial design proposals should also be subject to public comment.

For the trials to be serious experiments producing valid data, there must be sufficient time for careful preparation. Otherwise, there is substantial risk both of harm to the public and of the waste of resources on ill-conceived experiments. If the trials are well-planned, however, the resulting rules governing the trials should be a useful paradigm for general IP interconnection for the long term. The trials themselves could then focus on field-testing technical implementation.

31 While the Commission’s Technological Advisory Council (“TAC”) last fall released a presentation addressing VoIP interconnection issues, that document was focused on high-level aspects of transition ideas. The attached matrix of issues for consideration is labeled a “work in progress.” The document does not discuss such specific technical issues as lack of interconnection standards, call signaling, call completion concerns, etc. See Federal Communications Commission Technological Advisory Council, TAC Memo – VOIP Interconnection (Sept. 24, 2012), available at http://transition.fcc.gov/bureaus/oet/tac/tacdocs/meeting92412/VoIP-Interconnection-TAC-Memo-9-24-12.pdf. As HyperCube noted, however, in its HyperCube Petitions Comments at 6, 11, the TAC and the Commission’s Chief Technologist can play an important role in promoting industry consensus.
Issues, and on identification of areas in which additional work is needed before general implementation of IP-based interconnection.

C. Collaborative Development of Trials Designed to Ensure Consumer Protection and Promote Competition is Necessary Before Trials’ Start.

Incumbent local exchange carriers (“ILECs”) should not be able to dictate conditions for IP-based interconnection. Selection of wire centers should be a collaborative process, and any provider having a traffic volume equivalent to a minimum of four T-1s of traffic at that location should be entitled to direct IP-IP interconnection on equitable terms. Trials should be reversible to ensure protection of the public. And, after the preliminary industry standardization and trial design work is completed, the trial duration should allow for interconnection negotiations and trial implementation. It should not be considered unreasonable for trials to last one year or more, depending on issues that arise through each experiment.

1. Collaborative Wire Center Selection

For the trials to provide real-world data that will advance the Commission’s policy-making objectives, the trials should involve a variety of types of central offices. With respect to trial design issues, HyperCube recommends that there be an initial round of trials conducted in each former Regional Bell Operating Company territory. After completion of this round of trials, there would be a second round of trials involving rural ILEC central offices.

There should be an urban and a rural wire center trial in each former RBOC territory.32 While a first step in the selection process may be ILECs’ nomination of specific COs to participate in the trials, once an initial set of such COs is prepared, providers intending to

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32 HyperCube recommends that the initial round of trials involve Tier 1 carrier wire centers, with a subsequent round of trials applicable to RLECs, which have a longer IP transition glide path under the *USF/ICC Transformation Order*. 
participate should have an opportunity to comment on the suitability of a particular CO. Potential participants also should have a reasonable opportunity to propose alternative wire centers, explaining why the alternate selections are better suited for the trials or should be added to those previously proposed.

In making its final selection of trial COs, the Task Force must recognize that allowing ILECs unilaterally to dictate the CO selection will not result in useful real-world data appropriate for a competitive marketplace. Nor will unilateral selection of wire centers by nominating carriers ensure that the trials provide reasonable models of an open IP interconnection environment with the respective costs of reaching the points of presence equitably allocated between interconnecting parties.33

2. Carriers with Traffic Volumes to Exchange of Four T-1s to Receive Direct IP-IP Interconnection.

To ensure there is a competitive environment for the trials, the Commission should require direct IP-IP interconnection whenever a requesting carrier has a volume of traffic to exchange that is equivalent to at least four T-1s.

In HyperCube’s Comments34 and Reply Comments35 on the Further Notice of Proposed Rulemaking in WC Docket 10-90, HyperCube recommended that the Commission require ILECs to interconnect directly on an IP basis upon request by another carrier if the requesting

33 Use of a four (4) T-1 direct interconnection standard, however, should promote interconnection arrangements that are economically justified on both sides.
34 HyperCube FNPRM Comments at 5 – 7.
35 HyperCube FNPRM Reply Comments at 3 – 11.
36 Under HyperCube’s proposal, for rural ILECs (“RLECs”), there would be a rebuttable presumption that this amount of traffic would warrant direct interconnection even in situations in which an RLEC raised Section 252(f) concerns before a state commission. See HyperCube FNPRM Comments at 7; HyperCube FNRPM Reply Comments at 5 - 6.
carrier has four T-1s of traffic to exchange. The four T-1 level is an unofficial industry standard for determining when direct interconnection is economically advantageous to both carriers.\textsuperscript{37}

This four T-1 standard is similarly appropriate as a requirement for mandatory direct IP interconnection in the context of the IP trials. The use of this standard will ensure that all providers desiring to participate in the trials will have an opportunity to do so, and also it should ensure that all providers preferring indirect IP interconnection through use of an intermediate carrier will have multiple options for obtaining such interconnection.\textsuperscript{38} Application of this standard in the trials will also provide an opportunity for testing the economic reasonableness of the four T-1 standard.\textsuperscript{39}

Moreover, there is substantial reason for concern that, absent the use of such an objective standard for mandatory direct IP interconnection, AT&T may force other carriers to interconnect only via AT&T’s wholesale AVOICs (“AT&T Voice Over IP Connect Service”)\textsuperscript{40} product

\textsuperscript{37} Indirect IP interconnection would, however, be available to all desiring to participate in the trials, regardless of their levels of traffic to be exchanged.

\textsuperscript{38} General participation is important for useful trials, because there would be little point to a trial that, for example, tested only whether AT&T’s various affiliates could achieve IP-based interconnection on terms of AT&T’s choice.

\textsuperscript{39} Under Section 251(f), state commissions evaluate whether RLECs are required to enter into interconnection negotiations if there is a hardship claim. 47 U.S.C. § 251(f). HyperCube has recommended that the Commission establish the four T-1 traffic level as demonstrating a \textit{bona fide} interconnection request that shifts the burden of proof to the RLEC to demonstrate hardship. \textit{HyperCube FNPRM Comments} at 4 – 6.

\textsuperscript{40} This product, a wholesale offering designed for VoIP service providers, offers “unbranded and unbundled transport and termination of your domestic and international VoIP traffic with the reliability, security and performance you expect from AT&T” and uses AT&T’s Managed Internet Service (MIS)/Multiprotocol Label Switching – Private Network Transport (MPLS-PNT) service.” AT&T, AT&T VoIP Services: AT&T Voice Over IP Connect Service (AVOICS) 1 (last visited July 8, 2013), available at http://www.business.att.com/content/productbrochures/AVOICS_1169.pdf. It also offers media conversion so that native IP and non-native IP traffic delivered to AT&T in IP format can be
designed for AT&T’s VoIP provider customers, or through some other AT&T-selected arrangement that will not be equitable and suitable for both parties. Until very recently, AT&T has been regularly requiring HyperCube and other carriers to use its wholesale voice AVOICS product for IP interconnection regardless of the appropriateness of this wholesale voice product for the carriers’ situations.

Despite AT&T’s describing this product as an “unbundled” offering, it “features” connection to AT&T via AT&T’s “Managed Internet Service (MIS)/Multiprotocol Label Switching – Private Network Transport (MPLS-PNT) service.” HyperCube handles its own transport, as well as database inquiries and updates, and it does not need to pay AT&T to duplicate HyperCube’s network capabilities. HyperCube’s own switches can “collect, format, guide and rate minutes of use.” Similarly, while AVOICS includes a media-conversion capability, media conversion is already provided by HyperCube to its customers, and the AVOICS offering is thus superfluous and redundant. These “features” are unnecessary, extra-cost items for a carrier such as HyperCube with respect to its intermediate services. In short, AVOICS is not a carrier interconnection solution, particularly for carriers competing with AT&T in offering wholesale services to VoIP providers.

Even with the unnecessary features removed, the per minute costs of AVOICS are higher than those of traditional interconnection. In some cases AT&T has attempted to push HyperCube to use AVOICS when a simple augment would have been sufficient. The adverse terminated to TDM network. *Id.* at 2. Transport and terminating access are billed separately. An intermediate carrier, however, needs only interconnection, not any of these services, which replicate and compete with a CLEC’s own network capabilities and third party product offerings. AT&T should not be able to force its competitors to use AVOICS in order to interconnect with AT&T on an IP basis.
result for competitors is increased costs that squeeze the margins derived from their own efficiencies, depriving the public of competitive benefits. The FCC should not accept a “gatekeeper model” in which an incremental cost per minute is imposed on interconnecting providers through any means in lieu of much-more-efficient traditional interconnection. Rather the established interconnection rules should continue to apply – regardless of technology.

While HyperCube has no objection to AT&T’s making AVOICS an option for those desiring to use the product, AT&T should not be permitted to require its use or the use of some other non-carrier product. Rather, as the Telecommunications Act mandates, carriers must have direct interconnection rights.41

Adoption of the four T-1 traffic level standard for the right to direct IP-IP interconnection during the trials will establish a bright line for honoring those rights during the trials. Using this standard, the Commission will be able to collect data both about the reasonableness of the standard and about the technical requirements for direct IP interconnection on terms that are mutually satisfactory to both interconnecting parties.

3. Design Trials to be Reversible.

With respect to COs selected for the IP interconnection trials, that the interconnection arrangements be reversible partially, and in their entirety if necessary, is also critical to protecting the public and to ensuring a competitive marketplace.42 The all-IP wire centers should be established as temporary, trial arrangements that can be reversed completely or, with

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41 As noted in the Introduction to these Comments, the statutorily-mandated interconnection rights and obligations must be the baseline for interconnection during the trials, and they may not be unilaterally abrogated by AT&T or any other party.

42 See Trials Public Notice at 9 ("We propose that customers would be informed of when they will be allowed to switch back to their previous wireline products and that they may do so at no charge for some pre-established period, including after the trial period end date.").
the Commission’s approval following public comment, in part. AT&T and others should not be permitted to use the trials as a vehicle for eliminating or avoiding their interconnection obligations at any CO.[^43] Nor should ILECs be allowed to use the trials to establish on a *de facto*, much less a *de jure*, basis the interconnection points of presence and arrangements they unilaterally wish to implement on their own terms. The focus should be on experimenting with what is needed from a technical perspective to make IP interconnection in a competitive marketplace effective, efficient, and equitable, not on demonstrating that AT&T can implement IP interconnection when it wants to, where it wants to, and how it wants to.

Moreover, there are already concerns that consumers may lose existing services on which the public relies[^44], and the Commission should make clear from the very beginning that this is not the purpose and will not be the result of the trials. Consumers will not be protected if they cannot return to the *status quo ante* because the “trials” are not conducted as voluntary

[^43]: *Cf.* Letter from Jodie Griffin, Staff Attorney, Public Knowledge, to Marlene H. Dortch, Secretary, FCC, GN Dkt. 13-5, *et al.* (Jun. 12, 2013) at 3 (“The Commission cannot let natural disasters become opportunities for carriers to shortcut the deliberations currently underway to comprehensively consider how best to handle the phone network’s transition to IP-based technologies. Otherwise, basic features of the phone network like a user’s ability to choose her long distance provider or attach her own device, or long-established expectations around reliability and public safety access could fall by the wayside without so much as a deliberate, public debate.”).

[^44]: *See AARP NY Comments; Samantha Bookman, NY Attorney General Files Injunction Request as Verizon Eyes Catskills for Voice Link Service*, Fierce Telecom, June 27, 2013; Communications Daily, State Telecom Activities, July 1, 2003 (“Wednesday, the office of Attorney General Eric Schneiderman alleged Verizon is violating a May PSC order by deploying and promoting Voice Link beyond Fire Island, an area where the regulator had officially sanctioned the fixed wireless service as a sole offering”); Communications Daily, State Telecom Activities, June 28, 2003 (“On Wednesday, PSC staff also sent Verizon their questions about the service, looking at operations from May through this coming October. It asked the telco for information about dropped calls, 911 call completion and other information. (http://bit.ly/17FLbcr). The New York Legislature is considering Assembly Bill 7635, which proposes ‘a moratorium’ regarding ‘the replacement of landline telephone service with a wireless system’ (http://bit.ly/126MTvu).”).
temporary experiments. Every effort must be made to avoid any service disruptions to consumers during the trials, and consumers must be assured that the continuity of their service, and of their quality of service, is a primary focus of the trials. Nonetheless, it is the essence of the trials to be experiments, and some glitches must be expected. Only if the trials are established as limited-duration arrangements, and are designed to be reversible, however, can consumers be assured that their concerns are paramount.

4. Consider Trial Duration of a Minimum of One Year.

Each round of IP interconnection trials (Tier 1 and RLEC) should be expected to last a minimum of one year, once the preliminary issues have been resolved. Initial trials limited to questions of direct access to numbers are scheduled to last six months, and the issues relating to IP-based interconnection are broader. Once preliminary technical issues such as signaling and database use are resolved, and the trial design issues are resolved, there will still be a need for agreeing on the specific terms and conditions for interconnection at each CO by the interconnecting service providers.

Like the Commission, HyperCube has a preference for individualized, bilateral commercial agreements. HyperCube also has, and has opted-in to, a large number of interconnection agreements implemented pursuant to Section 252(i). Both of these types of existing agreements with ILECs, however, relate exclusively to interconnection in TDM format.

45 Numbering Policies for Modern Communications, Notice of Proposed Rulemaking, Order and Notice of Inquiry, 28 FCC Rcd. 5842, ¶ 102 (2013) (“VoIP Numbering Trial Order”) (limiting trial duration to six months from the date of Bureau approval of a trial proposal).

46 In the USF/ICC Transformation Order, the Commission said “the interconnection and intercarrier compensation framework adopted in sections 251 and 252 of the 1996 Act reflect a policy favoring negotiated agreements, where possible.” USF/ICC Transformation Order at ¶ 965; see also id. at ¶ 964.
even when HyperCube performs media conversion on native IP traffic exchanged with an ILEC. Thus, many of these agreements will need to be re-negotiated to address IP-based interconnection. This process takes time, even when both parties are motivated to achieve agreement.

In many cases, moreover, agreement is not achieved without arbitration by state commissions. The state commissions are often resource-starved, and many of their former telecommunications experts have retired or been reassigned to handle other utility matters. As indicated recently by the Illinois Commerce Commission, IP interconnection raises issues of first impression, and states may be reluctant or unprepared to handle them absent development of a complete record.

Thus, even trial periods of a year may leave little time for actual experience with implementation of IP-based interconnection, because much of the period must be devoted to contract negotiation. Once the trials are concluded, there must be adequate opportunity for careful evaluation of their results before the trials can be deemed successfully concluded.

D. Trial Implementation Must Be Grounded in the Telecommunications Act

1. Section 251/252 Interconnection Obligations Are the Framework for IP-IP Interconnection.

Trials lacking the essential regulatory predicate for a competitive marketplace would not be “real-world” trials that could produce any results that could legitimately inform the development of telecommunications regulatory policy. An ill-defined, ambiguous good faith

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47 ICC Decision, at 34 (rejecting call request to include IP-IP traffic in the arbitration agreement due to the incompleteness of the record in a case of first impression and the lack of FCC guidance).

48 See Lev Remarks (“the goal of [any trials] will be to provide the Commission with real-world information to assist it in making policy decisions relating to ongoing technology transitions.”).
standard is no substitute for rules implementing statutory mandates.\textsuperscript{49} Proceeding without the statutorily-mandated, technology-neutral\textsuperscript{50} regulatory rights and obligations, and allowing large ILECs such as AT&T to dictate the trial parameters of their choice on a “greenfields” basis\textsuperscript{51} would waste the Commission’s and the participants’ resources.\textsuperscript{52}

As noted above, HyperCube’s regular and preferred practice is to enter into negotiated bilateral agreements addressing interconnection and inter-carrier compensation issues. The trials could present an opportunity to negotiate the specific issues relevant to IP interconnection, but

\textsuperscript{49} Cf. USF/ICC Transformation Order at ¶ 1337 (quoting Local Competition First Report and Order, 11 FCC Rcd 15499, ¶ 55 (1996) (“‘n’egotiations between [ILECs] and new entrants are not analogous to traditional commercial negotiations in which each party owns or controls something the other party desires.’”); id. at ¶ 1353 (“when section 251(c)(2) applies, it is subject to a statutory requirement of good faith negotiations under section 251(c)(1), with enforcement available through state arbitrations under section 252. Further, the Commission already has adopted guidance for evaluating claimed breaches of good faith negotiations under section 251(c)(1).”) (footnotes omitted).

\textsuperscript{50} USF/ICC Transformation Order at ¶1342. (“[S]ection 251 of the [Telecommunications] Act is one of the key provisions specifying interconnection requirements, and . . . its interconnection requirements are technology neutral—they do not vary based on whether one or both of the interconnecting providers is using TDM, IP, or another technology in their underlying networks.”).

\textsuperscript{51} See Trials Public Notice at n.23 (citing AT&T Comments, GN Dkt. 12-353 (Jan. 28, 2013) at 11; AT&T Reply Comments, GN Dkt. 12-353 (Feb. 25, 2013) at 32-33 as stating interconnection regulation under §§ 251 and 252 is needless and harmful and beyond FCC authority); cf. Lev Remarks (noting that in testing regulatory frameworks Commission “need[s] to ensure that the results don’t simply reflect carriers on their ‘best behavior.’’’). Cf. Letter from Charles Acquard, Executive Director, NASUCA, \textit{et al.}, to Marlene H. Dortch, Secretary, FCC, WC Dkt. No. 10-90, \textit{et al.} (Nov. 20, 2012) at 4-5 (asserting that AT&T seeks to abandon its copper networks and its Carrier of Last Resort (“COLR”) obligations to offer basic voice service); \textit{id.} at 6 (asserting AT&T seeks to end network unbundling obligations, jeopardizing existing non-cable competition).

\textsuperscript{52} The structure of the trials should be not be dictated by fears that Tier 1 carriers will not participate unless they are exempted from their statutory obligations. \textit{See Trials Public Notice} at n.17. There can be no expenditure of public funds for trials unless their sole objective is to provide information required by the Commission to carry out its statutory mandates; the private regulatory agendas of potential participants are irrelevant.
the extensive history of the development of telecommunications competition has demonstrated that such negotiations cannot fruitfully proceed in a regulatory vacuum. As proposed by AT&T, however, these trials do not appear to construct a framework to do much more than allow the incumbents to shed their regulatory and technical requirements that have helped foster competition.

2. The 14-Point Competitive Checklist Remains Relevant.

It is therefore important that, before a trial is deemed ready to begin, the ILEC “hosting” the trial demonstrate that the conditions necessary for a competitive environment are in place. In the 1996 Act, Congress required full compliance with a 14-point competitive checklist before a former RBOC was permitted to enter the long distance market. The Commission has characterized this requirement as “the embodiment of the quid pro quo established by Congress.” The BOC had to show, with respect to each checklist item, that it was “providing non-discriminatory access” to that checklist item, by showing that it was “currently furnishing, or is ready to furnish, the checklist item in quantities that competitors may reasonably demand and at an acceptable level of quality.”

That an ILEC is already in the long distance business does not exempt it from having a continuing obligation to comply with the checklist. It is therefore appropriate for the Commission to ensure that the obligations set forth in the Competitive Checklist are fulfilled

55 See Summary of 14 Point Competitive Checklist (emphasis added).
56 Id.
throughout and beyond the IP-trial process to ensure the conditions necessary for a competitive market.

This is another situation in which the pre-trial collaborative workshop process can be used effectively to agree on any special requirements that may apply to IP-IP interconnection, and on the manner in which the hosting ILEC could demonstrate its readiness and eligibility to begin the trial.\(^{57}\) Participants could also agree that specific elements of the checklist, such as dialing parity, may already have been satisfied by procedures already in effect.

**CONCLUSION**

The requirements of the Telecommunications Act must remain the foundation for interconnection arrangements. This is essential for a seamless evolution to all-IP networks in a competitive marketplace in which consumers can continue to receive telecommunications services of the highest quality throughout the transition from TDM to IP networks.

A collaborative process open to all stakeholders is most likely to result in thoughtfully designed and well-planned trials that will provide useful and valid data about issues raised by IP interconnection while ensuring protection of consumers and competitive markets. Public input is important with respect to all aspects of trial design, including selection of trial sites, duration of trials, provider participation (including the availability of direct IP interconnection at trial sites to all providers with traffic volumes equivalent to four T-1s), and data collection and evaluation methodology. Trials that focus on identifying and addressing real-world issues that currently may inhibit effective IP call flows may be particularly useful as test-beds for solving practical

\(^{57}\) In establishing the limited-duration trials for direct access to number resources by VoIP providers, the Commission similarly prescribed requirements that participants had to satisfy before their proposals would be accepted. *VoIP Numbering Trial Order* at ¶ 88.
Comments of HyperCube Telecom, LLC
GN Dkt. 13-5

problems. Preparation for the trials provides an excellent opportunity to revive stalled industry efforts to achieve consensus with respect to critical database utilization practices and call signaling protocols.

HyperCube therefore recommends that the Task Force use pre-trial workshops open to public participation to design trials so as to focus on such limited but critical technical concerns, as well as to develop overall trial design proposals.

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