

NANC IVC WG Report

September 2019

**Federal Communications Commission (FCC)
North American Numbering Council (NANC)**

**Interoperable Video Calling Working Group
(IVC WG)**

Report on Interoperable Video Calling

Final Report to the NANC

September 2019

TABLE OF CONTENTS	PAGE #
Executive Summary	3
Background	5
Description of IVC	5
Scope	6
Description of Database Approach	6
Description of Platform Approach	7
Recommendation	7
<i>Appendix A: Membership of the IVC Working Group</i>	9
<i>Appendix B: IVC Call Flow Examples</i>	10
<i>Appendix C: Glossary</i>	11

Executive Summary

Consumers are increasingly relying on a variety of real-time video technologies for personal, educational, occupational, and emergency communications. With the exception of Video Relay Services (VRS), consumers cannot communicate across these services. For this reason, the Federal Communications Commission's (FCC or Commission) Wireline Competition Bureau (Bureau) tasked the North American Numbering Council (NANC) with creating an Interoperable Video Calling (IVC) Working Group to explore how to facilitate the provision of interoperable telephone number-based video calling with a goal of increasing the use of video calling for consumers, including people with hearing and speech disabilities, using different, otherwise incompatible video calling equipment and services. Specifically, the Bureau's July 3, 2018 letter establishing the IVC Working Group said "[w]e envision carriers and providers being able to voluntarily offer, to any customer, the capability to make or receive a video call between ten-digit NANP numbers."¹

Over nine months, the IVC Working Group evaluated available video calling services, the steps necessary to offer IVC services, and consumers' demand for IVC.² The IVC Working Group found that the overall market for video calling services is emerging, in contrast to the relatively mature nature of the VRS market.

The Working Group recognized that, today, most video calling services only offer the ability to make video calls within the same service (i.e., non-interoperable video calls). As a result, many consumers maintain accounts with multiple video calling services and platforms to be able to communicate with consumers using different video calling services and platforms. Though the nature of consumer demand for IVC is relatively unstudied, the IVC Working Group understands that consumers, including those representing the deaf and hard of hearing communities, desire IVC. The Working Group also recognizes that there are social and public safety benefits to interoperability. In the VRS context, the Working Group recognizes that limiting users' registration of telephone numbers under VRS providers is not functionally equivalent and does not fulfill the desires of the deaf and hard of hearing community for having a single phone number for voice, video, data, and text services with seamless N11 call handling and routing.

¹ See, Letter from Kris Monteith, Chief, Wireline Competition Bureau, FCC, to North American Numbering Council Chair (July 3, 2018), ("Wireline Bureau Letter"), <https://docs.fcc.gov/public/attachments/DOC-354696A1.pdf>

² A 2012 survey by Cisco and Purple Insights found that 89 percent of respondents felt that the ability of two devices or programs made by different companies to communicate with one another – known as interoperability -- was personally important to them. Nearly half indicated that interoperable video calling is extremely important to their use of devices at home or at work. 77 percent want video calling to be as easy as making a ten-digit phone call is today. See, Cisco, *New Survey: Likely U.S. Voters Strongly Back Open Video Calling, Want Technologies to Work Together for Job Creation, Social Benefits and Key Services*, Aug. 28, 2012, available at <https://newsroom.cisco.com/press-release-content?type=webcontent&articleId=1004384> (last visited August 8, 2019).

NANC IVC WG Report

September 2019

In order to achieve interoperable video calling, the IVC Working Group identified three distinct elements: addressing, signaling and media.

Addressing refers to the ability of an originating service to identify a receiving device and service that will support the signaling and media necessary to complete a communication. For example, VRS uses an Interstate Telecommunications Relay Services Database (iTRS Database) of ten-digit telephone numbers for purposes of addressing to support interoperable VRS.

Signaling and media require interoperating video calling services and devices to support relevant standards and agreed upon technical specifications. Given that the IVC Working Group reports to the NANC, the IVC Working Group focused on the issue of addressing as the interoperability issue most germane to the NANC's scope of work.

After reviewing the Commission's iTRS Database as an example, the Working Group chose to focus on two distinct theoretical frameworks for using ten-digit telephone numbers to facilitate addressing: the "database approach" and the "platform approach".

The database approach would contain telephone numbers and other necessary information, including URIs, to determine whether an originating video call can be completed to a receiving device and service, similar in nature to the function of the iTRS Database.

The platform approach utilizes network operator capabilities to facilitate the addressing function that may use a variety of identifiers, such as telephone number or other unique identifiers, to enable the originating service to query whether the receiving device and service can accept a video call.

The IVC Working Group was not able to reach consensus on a particular path within the time allotted because both approaches raise significant operational and technical questions that require further evaluation. The IVC Working Group provides this report to identify paths towards an IVC environment. Our efforts are intended to help the NANC and the FCC focus on solutions that can eventually promote interoperable video calling services. We remain available and willing to continue to work with the NANC and Commission to further evaluate these issues.

Background

On July 3, 2018 the FCC's Wireline Competition Bureau released a Public Notice announcing the formation of the Interoperable Video Calling Working Group of the Commission's North American Numbering Council (NANC). The Commission's Wireline Competition Bureau directed the NANC, through the Working Group, to provide the Bureau with a final report of its findings. This Working Group held weekly meetings, with few exceptions, over nine months, beginning in October 2018.

Description of IVC

The FCC released the IVC WG Public Notice ("Notice") on July 3, 2018 that established the Working Group with the purpose of "explor[ing] how to facilitate the provision of interoperable telephone number-based video calling, allowing service providers to voluntarily offer, to any customer, the capability to make or receive a video call between 10-digit North American Numbering Plan numbers."³ The FCC welcomed participation by industry stakeholders who have an interest in developing and integrating video calling for both hearing individuals and people with hearing and speech disabilities who may currently use different, otherwise incompatible equipment and services.

In addition to issuing the Notice, the Bureau sent a letter to the Chairman of the NANC, dated July 3, 2018,⁴ directing its IVC WG to:

- "Provide options for, and analyses of, any changes necessary in numbering or numbering administration to allow and encourage the deployment of telephone number-based interoperable video calling, including any changes to Commission rules, and any change, migration, or consolidation of existing numbering directories, including the TRS Numbering Directory;
- Describe any recommended developments in technology, standards, or operations required to promote the deployment of telephone number-based interoperable video calling, including the incorporation of interoperable video calling in the implementation of NG911; and
- Recommend next steps the Commission and industry should take to promote interoperable video calling services."

The Bureau further directed the NANC to approve a written report of its finding on those issues, and to transmit that report to the Bureau. The NANC approved this report on September 12, 2019, which is publicly available at <http://www.nanc-chair.org>.

³ FCC, Public Notice, DA 18-697, CC 92-237.

⁴ See, Wireline Bureau Letter.

Scope

In order to effectively and efficiently produce a report, the IVC Working Group determined that the report should include:

- recommendations on addressing, signaling, and media; and
- the ability to make point-to-point video calls, using ten-digit telephone numbers, across video service boundaries.

For these reasons, the scope of this Report includes the ability of video calling users to: (1) discover which of their contacts are video-capable, regardless of which service they use; (2) initiate and establish calls to users on another service; and (3) exchange audio and video and communicate across services.

The Working Group determined that the focus of the Report would not include: (1) whether all devices that make calls should be video capable; (2) whether all devices should be able to use a telephone number; and (3) whether all video conferencing services should use telephone numbers; or (4) multi-party video calling with screen sharing across services.

Description of Database Approach

The database approach would support interoperable video calling through an existing or new telephone number database to translate telephone numbers to URIs and would indicate video capability among video service providers. It would allow Over-the-top (OTT) and carrier providers to directly route calls to each other.

The database approach can be implemented in a number of ways, using either existing VoIP standards or newly-developed standards, and using either existing databases or databases specifically operated for interoperable video calling. We briefly describe two possible approaches here, but there are other variations. In general, it was seen as desirable to allow a single number to be mapped to multiple destinations, at least by function. For example, a user may want their voice calls to use their carrier-provided voice service, while using an OTT application for real-time text or video calls.

In a single-stage lookup model, the database maps a phone number directly to one or more URLs, probably a SIP URL identifying the gateway used by the carrier serving the subscriber. Typically, many numbers would share a single URL. As described below, ENUM, a DNS-based approach, has already been used for interoperable number-based video calling. ENUM entries can contain multiple records for the same telephone number, but can only distinguish signaling protocols and classes of applications, e.g., with separate entries for email, H.323 and SIP. It cannot currently advertise the media capabilities of the device. Recent efforts of carrying DNS requests in HTTPS, known as DOH and standardized as RFC 8484, rather than UDP or TCP allow more fine-grained access control to number mapping information.

In a two-stage model, a first request maps a telephone number to a database instance, with multiple databases operated by different vendors and possibly supporting different functionality.

September 2019

Each such database then maps numbers to signaling (SIP) URLs as before. The IETF MODERN working group has been investigating a generic HTTP-based number mapping and lookup protocol and requirements from the IVC effort could inform further design efforts in that group.

As noted, database approaches have already been implemented for video calling. For example, United States video relay services (VRS) uses a DNS ENUM (RFC 6116), operated by an entity contracted by the FCC (currently, Neustar), to map E.164 telephone numbers to the SIP URI representing the provider that currently serves that number. An additional database, the iTRS-URD, maps numbers to additional properties.

The existing number mapping databases used for number portability can support SIP URLs. Their ability to support this function merits further study and experimentation.

Description of Platform Approach

The platform approach would support interoperable video calling by utilizing the existing network capabilities of IMS networks to signal video calling. The platform approach builds on the existing Video over LTE (ViLTE) standard, which provides a path for network operator interoperability but does not support routing to, signaling or media exchanges with OTT providers.

The Platform approach uses IMS based signaling and video that is not compatible with any non-IMS IVC solution. The Platform proposal envisions that any non-IMS provider make arrangements with an IMS Telecommunications Service Provider (TSP) to serve as a transit network to another IMS TSP. So a call between two non-IMS IVC providers (IVC-A and IVC-B) which had arrangements with two different IMS based TSPs (IMS-1 and IMS-2), a call between a subscribers of IVC-A and IVC-B would route IVC-A -> IMS-1 -> IMS-2 -> IVC-B. There is no provision to route directly from IVC-A to IVC-B. An NNI interface between the IVC provider and the IMS provider would need to be developed. Further, regardless of the audio and video capabilities of IVC-A and IVC-B, all IVC calls would be limited to the IR-94 video standard and equivalent audio standards.⁵

Recommendation

The Working Group recommends further study through specific use cases by numbering and technical subject matter experts (“SMEs”) of the two primary frameworks to determine which option is more viable for achieving broad interoperability of video communications. Additionally, further evaluation is necessary regarding whether existing numbering databases can and should be utilized to facilitate IVC. The issues to evaluate include, but are not limited to performance, security, legal, and operational issues, including cost recovery mechanisms, such as

⁵ See, GSM Association, IR.94 - IMS Profile for Conversational Video Service, Version 13.0 (June 21, 2018), available at <https://www.gsma.com/newsroom/wp-content/uploads//IR.94-v13.0.pdf>.

NANC IVC WG Report

September 2019

how the database will be funded and which parties will bear the costs, as well as any efficiencies achieved.

The Working Group recommends that the NANC, in accordance with FCC direction, identify the appropriate numbering experts to develop and provide advice to the NANC on the use of existing numbering databases and commercially available interoperability databases for the purposes of evaluating the facilitation of a database approach to interoperable video calling. The designated entities should provide recommendations on the technical and operational feasibility of using existing or commercially available databases to support the database approach to telephone number-based IVC, or the development of a new database.

The Working Group recommends further study of a number of technical issues associated with IVC over traditional cellular networks, and the potential applicability of WebRTC, a new set of standard protocols to support audio/video communication over IP. New or modified technical standards will be necessary to encourage the development and utilization of telephone number-based interoperable video calling for either the database or the platform approach to IVC utilizing ten-digit telephone numbers with seamless N11 call handling and routing. Modifications to the iTRS Numbering Directory will also need to be identified.

The Working Group recommends that the NANC request that Alliance for Telecommunications Industry Solutions Internet Protocol Network-to-Network Interface Task Force (ATIS IP NNI), Alliance for Telecommunications Industry Solutions Emergency Services Interconnection Forum (ATIS ESIF), and Internet Engineering Task Force (IETF), as appropriate, to evaluate the development of technical and architectural details of each approach, including call-flows, interoperability use cases, and recommend an approach for Working Group consideration. In an IVC environment, implementation of the ability to invoke VRS mid-call carries several important benefits, including being able to use the same TN for texting, phone calls, and IVC calls, in addition to improved 9-1-1 routing over the current VRS configuration.

The Working Group recommends further study of the technical and operational feasibility of interoperating with VRS to ensure that people with disabilities can communicate with public-safety answering point (PSAP) telecommunicators using video, voice, text, and data during IVC-enabled NG9-1-1 calls. While the existing NG9-1-1 standards would allow IVC services to call 9-1-1, the specifics would be required to be included in any final IVC technical standards. The Working Group recommends further study into the implementation of WebRTC and Media Communication Line Services (MCLS), as set forth in the recommendations of the Emergency Access Advisory Committee (EAAC), established by the Twenty-First Century Communications and Video Accessibility Act of 2010.

Due to the necessity of further study to determine the proper approach, the need for additional input on numbering administration, further study of necessary technical standards, and further study of the technical and operational feasibility of interoperating with VRS, the Working Group requests an extension of its charter to further evaluate the recommendations of numbering and technical subject matter experts (SMEs) in order to provide more specific recommendations to the NANC.

NANC IVC WG Report

September 2019

NANC IVC WG Report

September 2019

APPENDIX: A

Interoperable Video Calling Working Group Members

Chairs:

David Bahar, Communication Service for the Deaf

Matthew Gerst, CTIA

Members:

Martin Dolly, Aaron Bangor (Alt.) and Jackie Flemming (Alt.), AT&T

Lydia Runnels, Bandwidth

Alagu Periyannan, Blue Jeans Network

Gurpreet Kaur, Mark Balsano (Alt.) and Glenn Clepper (Alt.), Charter

Richard Ray, City of Los Angeles

Chris Wendt, Comcast

Jonathan Roberts, Convo

Dr. Christian Vogler, Gallaudet University

Justin Uberti, Google

Sabrina Fields, NASRA

Daniel Henry, NENA

Prof. Henning Schulzrinne

Mary Retka, Somos

Isaac Roach, Sorenson

Karen Riepenkroger and Shaunna Forshee (Alt.), Sprint

John Martin, ZVRS and Purple Communications

Technical Advisors:

Jim Malloy, MITRE

Brian Rosen

Eric Burger, FCC CTO

FCC Liaisons:

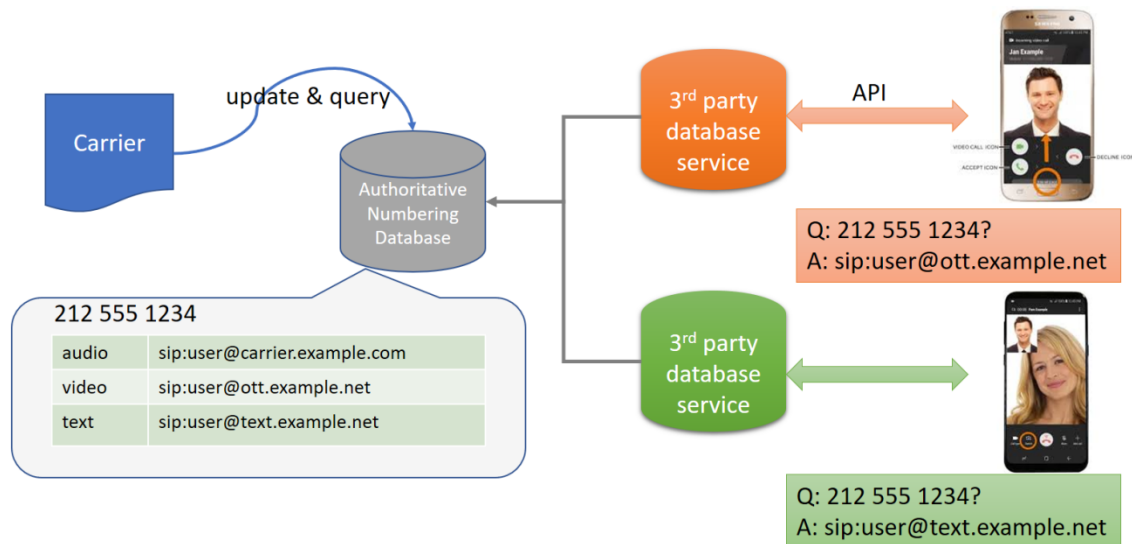
Robert McConnell, CGB

Michael Scott, CGB

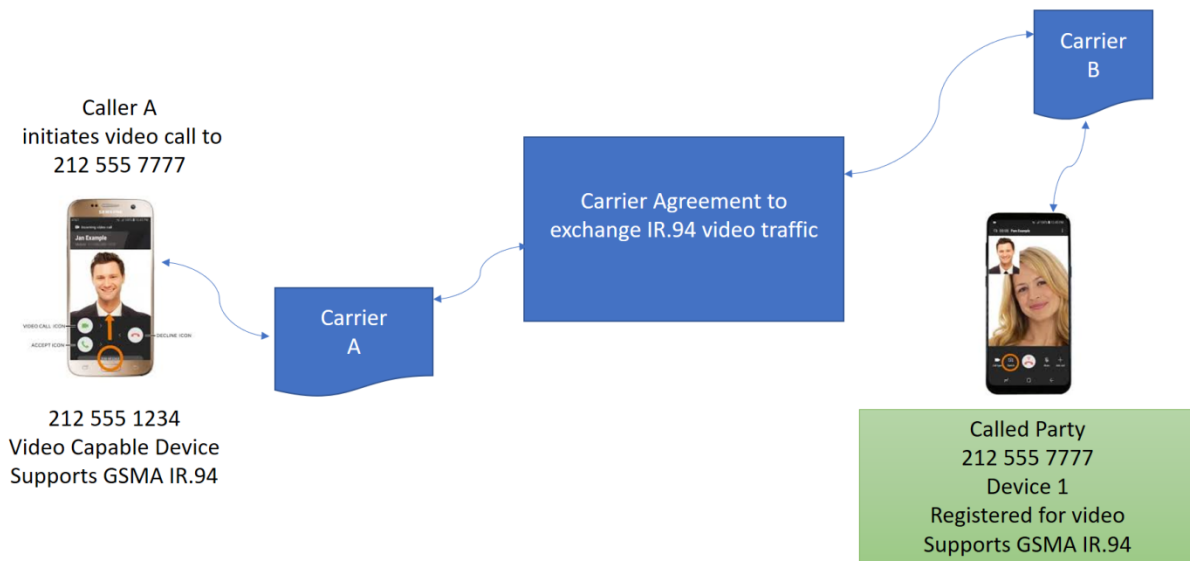
Bill Andrlle, WCB

Appendix B: Database and Platform Based Call Flow Examples

Database Approach



Platform Approach



NANC IVC WG Report

September 2019

Appendix C: Glossary

ATIS ESIF	Alliance for Telecommunications Industry Solutions Emergency Services Interconnection Forum
ATIS IP NNI	Alliance for Telecommunications Industry Solutions Internet Protocol Network-to-Network Interface Task Force
EAAC	Emergency Access Advisory Committee
FCC	Federal Communications Commission
IETF	Internet Engineering Task Force
IP	Internet Protocol
iTRS Database	Interstate Telecommunications Relay Services Database
IVC	Interoperable Video Calling
IVC WG	Interoperable Video Calling Working Group
MCLS	Media Communication Line Services
NANC	North American Numbering Council
NG9-1-1	Next Generation 911
OTT	Over-The-Top
PSAP	Public-Safety Answering Point
PTSN	Public Switched Telephone Network
SME	Subject Matter Experts
TRS	Telecommunications Relay Service
ViLTE	Video Over LTE
VRS	Video Relay Service
WG	Working Group