



**Before the  
Federal Communications Commission  
Washington, DC 20554**

In the Matter of	)	
Advancing IP Interconnection	)	WC Docket No. 25-304
Accelerating Network Modernization	)	WC Docket No. 25-208
Call Authentication Trust Anchor	)	WC Docket No. 17-97

**Comments of Richard Bennett<sup>1</sup>**

## I. Introduction and Summary

These comments pertain to the final transition of voice applications from TDM “Plain Old Telephone Service” (POTS) to the modern Internet. Now that telephony has become an

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application that runs over Internet Protocol networks, the time has come to shutter POTS and the regulations that governed it.

The FCC should facilitate the final transition by setting a date certain for the sunset of POTS regulations. Such an order will motivate the last remaining POTS stragglers to update their obsolete systems without causing a dearth of functionality for users of voice applications.

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## II. Background

My experience with POTS began in 1955, when I made telephone calls over a party line by telling an operator the exchange and number of the party I wished to call. This was often difficult as my family had recently moved from Benghazi, Libya to Morristown, Tennessee where English was spoken in a somewhat different dialect.<sup>2</sup> Rotary dialing was a godsend.

I went on to develop Quality of Service enhancements for Enterprise Wi-Fi that enabled a quadrupling of the number of wireless handsets that could share a 2.4 GHz channel with Mean Opinion Scores (MOS) at four or better.

The telephone network was the greatest advance in telecommunications since the telegraph, the system that first connected the world. The advent of digital PCM telephony in the mid-'60s was closely followed by the development of packet switching on the 1969 ARPANET. By 1975, users of America Online were "dialing" from their local exchanges to AOL servers in Virginia over the Telenet public packet switching network without knowing they were using anything but POTS.<sup>3</sup> Shortly thereafter, 1G mobile networks were built; they transitioned to digital in the 1990s while Wi-Fi was also being developed.

While original POTS was analog end-to-end, by the '90s analog was reduced to a tail connecting telephone sets to a digital network. Since then, the analog tail has been largely eliminated by handsets that incorporate direct digital interfaces.

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<sup>2</sup> Lily Tomlin's famous *Ernestine* sketch was written by Jane Wagner, a fellow resident of Morristown who spoke to the same operators I confused with my British/Midwestern accent. When I wanted to call the Washington exchange, Ernestine thought I was saying "U-U-A" because I said "double U" instead of "dubya."

<sup>3</sup> "Telenet," *Wikipedia*, December 26, 2025, <https://en.wikipedia.org/w/index.php?title=Telenet&oldid=1329522508>.

This is a roundabout way of saying that the writing has been on the wall for a very long time: the age of the analog phone and the technologies and regulations that have maintained it is over. It is therefore incumbent on the Commission to take out its eraser and remove Title II Telecommunication Service from its enforcement book.

Communication by voice is now simply an application that runs on our computers. It is, in other words, an Information Service to be regulated quite lightly (if at all.)

### III. Argument

#### A. VoIP is thriving but stragglers remain

The voice app marketplace is thriving, competitive, innovative, and successful. This is not a sphere of commerce requiring hand-holding and coddling by big, bad, powerful national regulators. Businesses and consumers have moved on from POTS to modern apps, as has most of government.

The stragglers that remain addicted to POTS are largely government systems with security and quality concerns that they don't know how to meet over Internet Protocol. This a familiar pattern to those of us who seek radio frequency (RF) licenses to bands currently occupied by government systems: agencies contract with suppliers for large, complex systems that include a communication component.

The design of the system is monolithic rather than modular; hence the agency can't update the communication component without replacing the entire system. This can be costly as well as time-consuming. The agency's budget is limited, so it demands an extension of time,

permission to continue operating a system that is barely fit for purpose while the greater economy grows restless.

## B. Congress should eliminate Title II

In the instant proceeding, the Commission needs to address Sections 201, 227, and 251 through forbearance. It also needs to declare with certainty that VoIP is an information service simply because Title II is no longer operational. And it needs to accelerate the transition from plain old 911 to NG911 with all of its obvious benefits.

The Commission probably can't erase Title II on its own through forbearance; if it takes Congressional action, the Commission should seek such action. The Commission also appears tempted to retain Title II, perhaps by classifying all VoIP services under its umbrella, simply to expand its regulatory power.

This would be a mistake, because it continues the illusion that VoIP packets are special. Before we can grant the wish to treat VoIP as if it were special, we need a rationale. Is one to be had?

## C. VoIP has neither special needs nor an indispensable role

Does VoIP have special needs, e.g. QoS, that no other application shares? Certainly not. Manufacturing, robots, Virtual Reality, and gaming also need strict latency performance. Does the voice network provide services that IP cannot provide? This argument has been made by the Department of Transportation still maintains a TDM network, as the NPRM notes:

*...Department of Transportation has emphasized that the Federal Aviation*

*Administration's Telecommunications Infrastructure (FTI) network "is heavily dependent*

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*on obsolete 1960s TDM technology across over 30,000 services at 4,600 sites.” [NPRM at 23]*

Given the fact that TDM switches are no longer manufactured, we have to express astonishment that this network has not already been replaced. Whatever these 30,000 services may be – and both the government and the public has a right to know exactly what and where they are – they certainly perform functions that can be provided over IP networks that are faster, cheaper, more secure, more reliable, and easier to manage.

#### D. Obsolete systems can be adapted to new network services

FAA maintains that it needs an entirely new suite of applications as well as a brand-new network.<sup>4</sup> Furthermore, it maintains that it cannot replace its systems before 2040 without additional funding. And it declines to state how long it will take to update its telecommunication networks and radios even if it gets additional funding.

The FAA appears to assume that it can only operate over a special purpose, private network. Surely commercial alternatives exist around FAA offices, especially those in airports. Given the wide range of options for IP networks and digital radios from today’s commercial providers, it’s likely that it could meet the FCC’s goal of ending TDM by 2028.

But again, the FCC will require cooperation from Congress to fund this long-overdue transition. The challenge here is more political than technical.

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<sup>4</sup> Department of Transportation, “Brand New Air Traffic Control System,” n.d., <https://www.transportation.gov/sites/dot.gov/files/2025-05/Brand%20New%20Air%20Traffic%20Control%20System%20Plan.pdf>.

The suggested approach would be for FAA to begin contracting for IP network services and cellular radios immediately, possibly by adopting the First Net model of public/private partnership rather than creating its own special purpose network. Once IP network services are in place, FAA can proceed to transition its old and new systems to the new network.

Providing IP connectivity across the FAA footprint should take a matter of months rather than years. The chief difference between TDM and IP for systems such as this one is in call setup and addressing rather than transport. Just as consumers use Analog Telephone Adapters (ATA) to attach analog phones to the Internet, so can FAA use adapters to connect its aged systems to IP networks.<sup>5</sup> In the worst case, government may need to fund the development of such transition equipment.

Similar adaptations can be adopted for other government systems in which obsolete IT is currently intertwined with obsolete telecom.

## E. The networking industry knows how to manage technology transitions

Technology transitions are routine in networking.

- Early end-to-end dialup Internet service provider connections were transitioned to use Telenet packet switching without changes to end user computers. User modems dialed up points of presence in the LATA that converted analog signals to digital and packetized them for transmission.

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<sup>5</sup> "Analog telephone adapter," *Wikipedia*, March 2, 2024, [https://en.wikipedia.org/w/index.php?title=Analog\\_telephone\\_adapter&oldid=1211361344](https://en.wikipedia.org/w/index.php?title=Analog_telephone_adapter&oldid=1211361344).

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- Early corporate Local Area Networks were transitioned from Xerox Network System (XNS) protocols to TCP/IP through dual-stack adapter cards or dual-stack device drivers. Applications that understood XNS addressing continued to use it side-by-side with TCP-native applications.
- IBM devices designed for RS-232 serial communication used terminal servers and gateways to access new Token Ring LANs.

This is not to mention applications and operating systems with backward compatibility. Hence, networking professionals aren't impressed by claims that changing the out-of-band signaling interface between a system and its communication substrate is a decades-long chore.

I agree that FAA's systems need an upgrade, but that should not be an impediment to switching from copper wire to fiber or from analog radios to digital ones.

## F. Fiber network QoS controls are superior to those in the PSTN

Digital telephony ensures latency by the use of isochronous protocols that interleave sub-packets into "tiny buckets." Isochronous protocols pay for low latency with higher overhead and by wasting unused buckets.

Fiber networks ensure low latency by frequency-division and time-division multiplexing. Commercial fiber from Google and others use the once-controversial process known as "network slicing" and by reservation.<sup>6</sup> Such systems have higher aggregate throughput and

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<sup>6</sup> "Google Fiber Teamed Up With Nokia to Pilot Network Slicing. Here's What That Means for You," CNET, accessed February 19, 2026, <https://www.cnet.com/home/internet/google-fiber-teamed-up-with-nokia-to-pilot-network-slicing-heres-what-that-means-for-you/>.

extremely low latency. Google Fiber, for example, exhibits less than one millisecond of Speedtest latency.

Any system that doesn't run successfully with one millisecond of latency needs to be redesigned and re-specified.

Network slicing protects preferred data from the congestion that can occur on unmanaged IP networks.

## G. The FCC doesn't need to specify voice exchanges

The networking industry sets standards through consensus standards and best practices chosen by participants. Voice and video conferencing providers offer specialized services by creating both private and semi-public Internet exchanges such as AMS-IX:<sup>7</sup>

### *About AMS-IX*

*AMS-IX (Amsterdam Internet Exchange) was founded in the early 90s as non-profit, neutral, and independent internet exchange in Amsterdam. Nowadays, AMS-IX processes over 5 Terabits of internet traffic per second during peak hours, and over 800 IP-networks are connected to their platform, making it one of the largest Internet Exchanges in the world.*

*The AMS-IX platform offers IP interconnection and peering services of guaranteed high quality for all types of IP traffic, whether this be traditional data, Voice-over-IP,*

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<sup>7</sup> "AMS-IX Relies on Fiber Optic Infrastructure Solutions from Rosenberger OSI," accessed February 18, 2026, <https://osi.rosenberger.com/news-media/fiber-optic-infrastructure-ams-ix/>.

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*mobile traffic, or video. These networks can provide their end-users (consumers as well as businesses) with stable, fast, and cost-efficient internet services through peering.*

*AMS-IX also manages the world's first mobile peering points: the Global Roaming Exchange (GRX), the Mobile Data Exchange (MDX), and the IPX connection point.*

*Additionally, AMS-IX manages another three Internet Exchanges abroad: AMS-IX Hong Kong, AMS-IX India, and AMS-IX Caribbean located in Curaçao. AMS-IX's subsidiary AMS-IX USA Inc. manages AMS-IX Bay Area, AMS-IX Chicago and AMS-IX New York in the United States.*

Voice providers who offer high-quality solutions at high-quality prices should be free to patronize AMS-IX. It is also the case that budget providers should be able to use common, low-cost, general-purpose exchanges. The well-functioning market ensures that all needs are met. Government should certainly police truth in advertising, of course.

## H. Unitary POTS has given way to a plethora of options for voice

While the FCC and others still regard telephony as a canonical application worthy of protection as well as encumbrance by massive regulation, in the real world ordinary people as well as professionals avail themselves of a variety of means to talk with each other across distances.

In addition to PSTN-like voice apps, we also take part in markets that offer to the ability to communicate with each other by text, voice, and video with varying degrees of quality and privacy. Not only do we communicate by standards-compliant VoIP, we also use Signal,

WhatsApp, Skype, Teams, Zoom, Facebook, Telegram, Discord, Viber, Marco Polo, Facetime, et al.

If the PSTN disappeared tomorrow, we would still be able to communicate with others with very little inconvenience. Even people with disabilities would be able to communicate with little extra burden.

## I. We still don't have a perfect solution to spam and robocalls

Some of the more intriguing questions in the NPRM deal with STIR/SHAKEN and Section 227. We have no quibble with STIR/SHAKEN as a practical present-day solution to unwanted calls. But STIR/SHAKEN is a point solution to a few forms of unwanted calling that is likely to be surpassed, as are all Internet standards, in the fullness of time.

Mandated solutions tend to produce quick fixes to current problems that may or may not be desirable in the long run. Are we to wait for the FCC to tell the developers of voice apps how to deal with customer complaints, or should we allow permissionless innovation to play its traditional role?

STIR/SHAKEN has a cost that may not be a good tradeoff for every person who pays for a VoIP subscription for simple convenience when filling out forms. Many people with phone numbers have almost no concern for call quality or security because they rarely answer calls from people they don't know.

It's great to see the Commission acting as convenor to bring voice providers together to discuss solutions to shared problems, but today's mandates are tomorrow's burdens. It's wise to allow trade associations, multi-stakeholder groups, and ad hoc standards bodies to light the way

to best practices. Technology is relentless, and it moves at several times the speed of deliberative government. It's best to let those closest to the problems develop the solutions.

## J. The Commission should only issue NANP addresses to services that conform with IETF VoIP standards such as SIP

For practical reasons, such as phone number exhaustion, NANP telephone numbers should only be issued to services that conform to evolving IETF standards for VoIP such as Session Initiation Protocol (SIP)<sup>8</sup> and Domain Name System Security Extensions (DNSSEC.)<sup>9</sup> DNS elements such as the Service Record (SRV)<sup>10</sup> and the Name Authority Pointer (NAPTR)<sup>11</sup> Resource Record support SIP. These standards ensure that information on phone number to server mapping is provided by parties who are who they say they are.

The role of phone numbers in VoIP is simply to serve as unique identifiers for subscribers; this purpose can also be accomplished by unique strings of text. Because there is a large installed base of VoIP devices and services, phone numbers will play a role in the lives of voice app users for some time to come. Hence, there is a need to protect subscribers from spoofing and impersonation.

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<sup>8</sup> "Session Initiation Protocol," *Wikipedia*, February 2, 2026, [https://en.wikipedia.org/w/index.php?title=Session\\_Initiation\\_Protocol&oldid=1336283969](https://en.wikipedia.org/w/index.php?title=Session_Initiation_Protocol&oldid=1336283969).

<sup>9</sup> "Domain Name System Security Extensions," *Wikipedia*, January 20, 2026, [https://en.wikipedia.org/w/index.php?title=Domain\\_Name\\_System\\_Security\\_Extensions&oldid=1333929545](https://en.wikipedia.org/w/index.php?title=Domain_Name_System_Security_Extensions&oldid=1333929545).

<sup>10</sup> "SRV record," *Wikipedia*, December 17, 2025, [https://en.wikipedia.org/w/index.php?title=SRV\\_record&oldid=1328012758](https://en.wikipedia.org/w/index.php?title=SRV_record&oldid=1328012758).

<sup>11</sup> "NAPTR record," *Wikipedia*, November 9, 2025, [https://en.wikipedia.org/w/index.php?title=NAPTR\\_record&oldid=1321283951](https://en.wikipedia.org/w/index.php?title=NAPTR_record&oldid=1321283951).

The Commission is fortunate to have experience with leading creators of VoIP, one of whom (Henning Schulzrinne) formerly served as its Chief Technologist.<sup>12</sup> As it develops its report and order in the instant proceeding, the Commission should convene a panel of VoIP experts to ensure that the rulemaking is sound, that it supports IETF VoIP standards, that it allows service providers to maintain conformance with evolving standards, and that it will allow VoIP and other messaging services to bring innovative products to market.

## IV. Conclusion

In essence, the FCC has come to a fork in the road for telephony regulation. One fork leads to the Commission shoe-horning VoIP and other messaging services into the legal framework of Sections 201, 227, and 251 designed for competitive TDM-based services. This entails reinterpreting terms and clauses to mean something different from their original meanings; it is fraught with legal and technical peril.

The other option is to recognize that voice is an app not fundamentally different from other Internet apps. App providers establish standards and best practices through cooperation with industry groups, multi-stakeholder organizations such as IETF and ICANN, and certification programs sponsored by industry groups such as the IEEE Standards Association and the Wi-Fi Alliance. This is the only option that makes any long-term sense.

The Commission should see its role vis-à-vis voice as a facilitator rather than a regulator. With a few minor exceptions, the TDM network has already been subsumed by the Internet.

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<sup>12</sup> "Henning Schulzrinne," *Wikipedia*, May 28, 2025, [https://en.wikipedia.org/w/index.php?title=Henning\\_Schulzrinne&oldid=1292735610](https://en.wikipedia.org/w/index.php?title=Henning_Schulzrinne&oldid=1292735610).

Similarly, the telephone service that once required its own purpose-built network has already been transformed into a feature that people use on the IP network in both its public and private forms.

The time has come for the FCC to accept the role that technology evolution has given it and to act accordingly. Technology is the ultimate authority over regulators and trying to hold it back is vain. King Canute demonstrated to his courtiers that mighty monarchs lack the power to control the tides.<sup>13</sup> Messaging apps will continue to grow more powerful simply because they enable consumers to access the information they want in the forms they prefer and to share it with whomsoever they choose. At best, regulators can nudge markets in constructive directions.

Internet-based messaging is the new normal and TDM is dead. We invite the FCC to officiate the memorial service for the technology that has been instrumental to the development of modern communication.

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<sup>13</sup> “Let all men know how empty and worthless is the power of kings, for there is none worthy of the name, but He whom heaven, earth, and sea obey by eternal laws.” See Henry of Huntingdon, *The Chronicle*.