July 19, 2024

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of Section 63.71 Application of AT&T Services, Inc., on behalf of its affiliate Southwestern Bell Telephone Company, LLC, d/b/a AT&T Oklahoma. Authority Pursuant to Section 214 of The Communications Act of 1934, As Amended, To Discontinue the Provision of Service	**File No.**

NETWORK PERFORMANCE TEST PLAN OF AT&T

1. Introduction

AT&T[1] intends to file a Section 214 application to discontinue AT&T Residential Local Service (the "Affected Service") in a limited number of wire centers in Oklahoma (the "Affected Service Area"). In preparation for this and other future discontinuance applications, and in view of the ongoing transition from wireline TDM-based services to next-generation technologies, AT&T has developed AT&T Phone – Advanced ("AP-A") as an IP-based voice product that provides substantially similar performance to the Affected Service. AT&T now has approximately 12,800 AP-A customers located in nineteen states. Those customers are spread across urban, suburban, and rural service areas, including the Affected Service Area for AT&T's forthcoming discontinuance application.

[1] AT&T Services, Inc. files this test plan on behalf of its affiliate Southwestern Bell Telephone Company, LLC, d/b/a AT&T Oklahoma.

AT&T specifically designed AP-A to qualify as an adequate replacement to legacy voice services under the Adequate Replacement Test ("ART") the Commission adopted in its 2016 Technology Transitions Order ("Tech Transitions Order" or "Order"). Appendix B to the Order instructs applicants seeking discontinuance under the ART to include "testing results" demonstrating that a proposed "replacement service provides substantially similar service to a legacy TDM-based service."[2] Appendix B further requires the submission of a "test plan," setting forth details related to the contemplated testing, to the Office of Engineering and Technology.[3]

Accordingly, AT&T submits this test plan for AP-A service in preparation for its forthcoming discontinuance application.[4] This document first outlines AT&T's plan to seek automatic grant under the ART's "totality of the circumstances" assessment; the testing protocols described herein have been designed with this standard in mind. Subsequently, this document offers a technical overview of the AP-A product and AT&T's testing protocols.

[2] *Id.* app. B ¶ 1 (requiring "testing to measure the network performance and service quality of any service identified in a Section 214 discontinuance application as a potential adequate replacement for a legacy voice service as part of a technology transition"); *id.* app. B ¶ 6.

[3] *Id.* app. B ¶ 3; *see also id.* app. B ¶ 3 n.4 (instructing that applicants provide details relating to network architecture).

[4] *Id.* app. B ¶ 6 (noting that "[t]he test plan and other supporting documents also are to be submitted to the Commission through its Electronic Comment Filing System (ECFS), and the test plan and other supporting documents should be made publicly available to retain eligibility for streamlined processing," and that "the testing necessarily takes place prior to submission of a given discontinuance application related to a technology transition, as the testing results must accompany the application").

2. The ART's Totality of the Circumstances Test

To be eligible for streamlined processing, discontinuance applications involving a "technology transition"[5] must show that an "adequate replacement" exists in the service area where discontinuance is sought. Under the ART, replacements for legacy voice service must offer:

> (i) substantially similar levels of network infrastructure and service quality as the applicant service; (ii) compliance with existing federal and/or industry standards required to ensure that critical applications such as 911, network security, and applications for individuals with disabilities remain available; and (iii) interoperability and compatibility with an enumerated list of applications and functionalities determined to be key to consumers and competitors.[6]

To meet the first prong of the ART, a replacement service must first provide "substantially similar network performance as the service being discontinued."[7] Applicants may demonstrate adequate network performance either "(i) through performance testing that demonstrates satisfaction of each of the benchmarks" set forth in the Order, or through "(ii) a demonstration, based on the totality of the circumstances, [that] the network still provides substantially similar performance and availability."[8] Applicants who make either showing are eligible for streamlined processing and the automatic granting of their application absent Commission action.[9]

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[5] A "technology transition" is defined as "any change in service that would result in the replacement of a wireline TDM-based voice service with a service using a different technology or medium for transmission to the end user." 47 C.F.R. § 63.60(i).

[6] Tech Transitions Order ¶ 65; *see also* 47 C.F.R § 63.602(b).

[7] Tech Transitions Order ¶ 15.

[8] *Id.* ¶ 91 (noting that "[t]here are two ways of demonstrating adequacy" under the ART).

[9] *Id.* ¶ 52 (noting that both applicants who "demonstrate compliance with objective criteria" and those who "make a demonstration that . . . the totality of the circumstances demonstrates that an adequate replacement" to legacy voice services exists both are "eligible for automatic grant").

Although AT&T's test plan closely tracks many of the benchmarks and protocols laid out in Appendix B of the Tech Transitions Order, AT&T intends to demonstrate that AP-A provides substantially similar performance to the Affected Service under the ART's "totality of the circumstances" standard.[10] The test plan described herein will provide more robust results than the Appendix B protocols in several important respects. For example, AT&T will test service for *all* AP-A customers across AT&T's entire geographic footprint, rather than just the small subset of customers Appendix B contemplates.[11] Because it would be infeasible to test "24 hours per day"[12] on a continual basis without tying up those customers' phone lines with nonstop calls, AT&T will test every successful (*i.e.*, answered) incoming or outgoing call for its thousands of existing AP-A customers, regardless of the time those calls are made. Further, AT&T will use a latency metric – specifically, a 200ms mouth-to-ear latency benchmark – that the Tech Transitions Order specifically endorsed as "compelling as a component of a totality of the circumstances showing."[13]

AT&T believes that the testing protocols described herein apply "measurement techniques and instrumentation" that "conform to best engineering practices."[14] The proposed

[10] *Id.* ¶ 90 ("We thus provide applicants the flexibility either to demonstrate compliance with all of the benchmarks described more fully below, or to provide evidence that demonstrates that . . . the network providing the replacement service nonetheless provides substantially similar performance and availability when considering the totality of the circumstances."); *id.* ¶ 91 (allowing applicants to "demonstrat[e], based on the totality of the circumstances, [that] the network still provides substantially similar performance and availability" to legacy TDM-based services).

[11] *See id.* app. B ¶ 9 (requiring applicants to use a sample size of 50 customers per replacement service).

[12] *Id.* app. B ¶ 8.

[13] *Id.* ¶ 99.

[14] *Id.* app. B ¶ 4.

testing methodology will provide sufficient data to show that AP-A satisfies the network performance sub-prong of the ART under the totality of the circumstances.

3. Description of AP-A Service and Network Architecture

A. AP-A Service Description

AP-A is an over-the-top VoIP product that is a replacement service option for customers of the Affected Service. AP-A leverages AT&T's substantial investments in its wireless network to ensure that residential customers who prefer a home phone service can enjoy continued access to dependable and cost-effective service.

AP-A's default form of connectivity is AT&T's LTE network. However, users can also connect their existing wireline broadband service to the AP-A device using an Ethernet cable, regardless of whether AT&T or another provider sells that wireline broadband service. If there is ever an outage or other connectivity issues with AT&T's LTE signal, AP-A's automatic failover functionality switches the device to the customer's wireline broadband service, without any action needed on the customer's part. Thus, AP-A is a broadband-technology-agnostic solution.

Although AP-A primarily connects to AT&T's LTE network, the device is designed to remain in a single location in the customer's home. Customers who purchase AP-A receive the device and associated peripherals at their service address. Customers can perform a self-installation/activation by following the simple instructions included in the box. Alternatively, customers can request that AT&T dispatch a trained technician to perform the installation/activation.

Customers can connect their existing TDM-based telephones directly to an AP-A device, or that device can be connected to customers' existing inside wiring and phone jacks. Because AP-A can use multiple means of transmitting data, AP-A offers customers greater redundancy

and reliability than legacy TDM-based services. AP-A can also reduce or eliminate the downtime associated with hard-to-service POTS lines after an outage. Through these and other means, AP-A provides reliable service with superior quality and lower maintenance costs than legacy copper-based voice service.

AP-A provides many features and advantages unavailable to customers of the Affected Service. For example, AP-A employs highly secure TLS encryption and offers industry-leading robust network security and performance, which AT&T constantly tracks via dedicated Data Monitoring Centers. AP-A customers also benefit from access to Digital Phone Call Protect, a robocall-prevention feature.

B. AP-A Network Architecture

AP-A routes calls through the same AT&T USP/IMS voice core network that AT&T currently uses for its wireline VoIP and Mobility VoIP/VoLTE services. AP-A calls consume only a *de minimis* amount of bandwidth – approximately 100 kbps. Figure 1 depicts the AP-A Network Architecture:

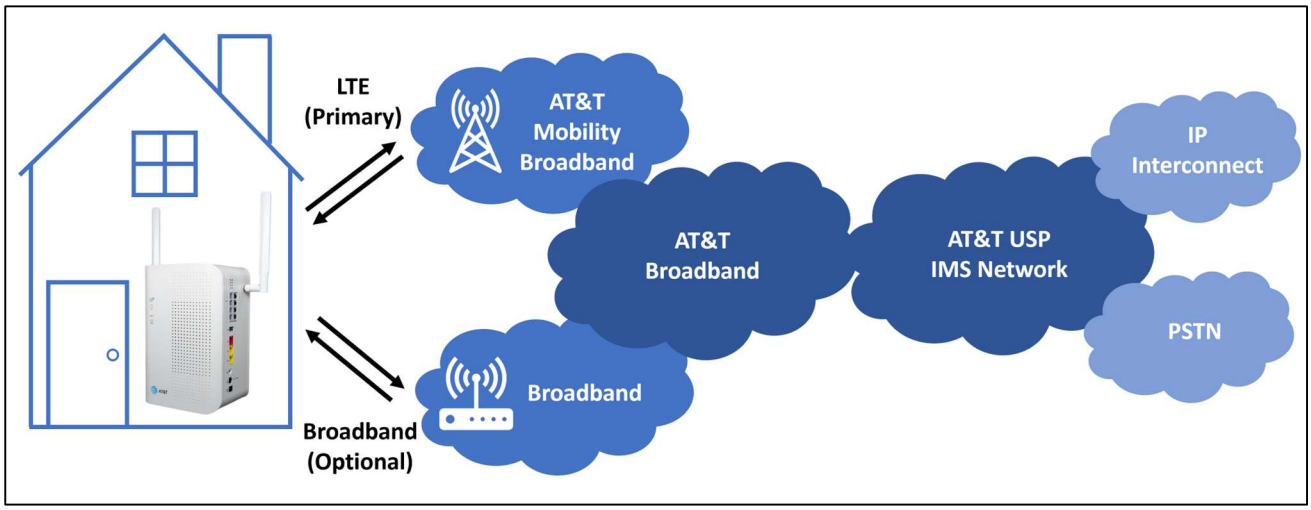

Figure 1: AP-A Network Architecture

As shown in Figure 1, the AP-A VoIP network architecture includes the following components[15]: Customer Premises Equipment (CPE), an Internet/Broadband network connection, and the (USP/IMS) voice core network.

- CPE: The CPE includes the AP-A device, which converts analog voice signals from a traditional telephone to VoIP using the G.711 codec. The AP-A device also converts analog signals from all TDM-based wireline devices included in the ART, such as fax machines and alarm systems, to IP using a cloud-based application service.[16] The AP-A device also provides full access to E911, using the service address and GPS coordinates at device activation.[17] The AP-A device then connects to AT&T's LTE wireless network and, optionally, via an Ethernet cable to the CPE from the customer's wired broadband service provider (whether AT&T or a third-party provider).
- Internet/Broadband Network connection: The AT&T LTE wireless connection or the customer's wired broadband connection is used for transport for the customer's voice calls.
- AT&T's USP/IMS voice core network: Regardless of whether the AP-A device is using AT&T's LTE network, an AT&T-provided wired broadband connection, or a third-party wired broadband connection, calls using AP-A are routed to the AT&T USP/IMS voice core network, which AT&T uses to route all of its wireline VoIP and Mobility

[15] *Id.* app. B ¶ 3 n.4 (instructing that an applicant's test plan must include "a detailed description of all relevant network components and all network-to-network interfaces" when describing network architecture).

[16] *See id.* ¶ 159 (requiring interoperability with certain low-speed modem devices to be eligible for automatic grant under the third prong of the ART).

[17] *See id.* ¶¶ 127-129 (detailing "911 accessibility and location accuracy requirements" to be eligible for automatic grant under the second prong of the ART).

VoIP/VoLTE services. The USP/IMS voice core network provides the following functions:

- Session Border Controller (SBC): The SBC gateway connects to analog call services, recording information, and bandwidth management control. It also balances and flows network traffic to achieve peak performance. The Public Switched Telephone Network (PSTN) is accessible via this VoIP gateway.
- Application Server: Call forwarding, call waiting and transfer, IP network phone service, and call detail records are all supported by this component. These functions are necessary to enable essential telephony functions for customers.
- SIP Services: Session Initiation Protocol (SIP) is responsible for connecting, disconnecting, and configuring call sessions. This protocol is a foundation for phone, video, and messaging technologies. This protocol is used for call setup and voice packetization.
- Database Services: The database services hold all the details of any SIP device. This database contains a registration for each machine, which is an endpoint. Furthermore, it allows a user to locate an endpoint and translate potentially different addresses in various networks.
- Interconnection: The USP/IMS voice core network is interconnected with other providers that offer voice services through IP interconnections or over the PSTN.

3. Performance Testing Plan Details

A. Testing Duration and Sample Size

AT&T will conduct performance testing for (1) mouth-to-ear one-way latency and (2) packet loss on *all* successful (*i.e.,* answered) calls of *all* AP-A customers, regardless of the time

of day or whether the calls are transported using AT&T's LTE network or a wired broadband service. Thus, AT&T's performance testing will not be conducted in a dedicated testing environment based on a small sample of customers; rather, it will be conducted on calls placed by real AP-A customers in their ordinary home environments, across the entire geographic footprint where AP-A is offered. AT&T currently has approximately 12,800 AP-A customers across areas of 19 states, who collectively place approximately 1,270,000 calls per month.[18] AP-A's current customer base includes a diverse set of customers across urban, suburban, and rural service areas. AT&T believes that the current AP-A customer base is broadly representative of AP-A's anticipated future customer base, which will continue to grow as AP-A's adoption rate rises.

AT&T will test *every* successful (*i.e.,* answered) incoming or outgoing call by or to *every* one of these customers. This sample size is more than two hundred times larger than the sample size of 50 customers the ART requires.[19] Testing will occur for 30 consecutive days, as the Appendix B protocols require.[20]

B. Testing Conditions

AT&T will measure performance when customers are actively using a phone connected to an AP-A device to make or receive phone calls. Every successful (*i.e.*, answered) incoming or outgoing call will be measured. AT&T will additionally measure and report the percentage of dropped calls and the percentage of blocked calls during the testing period.

[18] AP-A is currently available in areas in the following states: Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Missouri, North Carolina, Ohio, Oklahoma, South Carolina, Tennessee, Texas, and Wisconsin.

[19] *See id.* app. B ¶ 9.

[20] *See id.* ¶ 16 (requiring "30 days of network performance testing").

AT&T will test AP-A's one-way, mouth-to-ear latency to demonstrate compliance with a benchmark of less than 200 milliseconds on 95 percent of all tested calls. AT&T's latency benchmark is consistent with both the ITU G.114 standard and the Commission's recognition that "objective evidence that a non-packet-based replacement service meets the underlying 200 millisecond mouth-to-ear standard *would be compelling as a component of a totality of the circumstances showing*.[21] Indeed, the ITU G.114 recommendation regarding mouth-to-ear delay indicates that users are "very satisfied" with call quality with latency at or below 200ms. AT&T will test for data loss by seeking to establish that 95 percent of all tested calls have packet loss less than 1%, consistent with the data loss benchmark outlined in the Tech Transitions Order.[22]

[21] *Id.* ¶ 99 (emphasis added). The Tech Transitions Order also explains its roundtrip benchmark was "designed . . . to ensure that customers ultimately achieve 200 milliseconds mouth-to-ear latency." *Id.*

[22] *See id.* ¶ 100 (providing that "data loss should be less than 1 percent for packet based networks," measuring "the ratio of total lost IP packet outcomes to total transmitted IP packets"); *id.* ¶ 101 (noting that a "packet loss rate of less than 1 percent . . . will allow for successful quality voice calls"); *id.* app. B ¶ 17 ("The Order adopts a benchmark for data loss of less than 1 percent over all peak period round trip measurements for packet-based networks, which is informed by ITU-T standards.").

AT&T notes that many broadband technologies, including xDSL, and some cable and fiber offerings have inherent packet loss greater than 1% to some customers. *See*, *e.g.*, FCC, *Twelfth Measuring Broadband America Fixed Broadband Report* (2022), data for Chart 8, https://data.fcc.gov/download/measuring-broadband-america/2022/Chart%208-fixed-2022.xlsx; FCC, *Eleventh Measuring Broadband America Fixed Broadband Report* (2021), data for Chart 8, https://data.fcc.gov/download/measuring-broadband-america/2021/Chart%208-fixed-2021.xlsx. Wireless networks also experience inherent packet loss. Consequently, when AP-A calls are routed over a connection, those calls will experience the same amount of packet loss as the underlying technology.

AT&T anticipates that its data will also show that average packet loss is less than 1%, which would also be sufficient under the Tech Transitions Order. *See* Tech Transitions Order ¶ 95 n. 255 (citing Chart 8 of the 2015 *Measuring Broadband America Fixed Broadband Report* as support for the 1% packet loss standard); FCC, *Measuring Broadband America Fixed Broadband Report* (2015), Chart 8, https://www.fcc.gov/reports-research/reports/measuring-broadband-america/measuring-broadband-america-2015 (showing "average packet loss" for each participating company).

Latency and packet loss will be measured between the caller and callee end points through the following network segments depending on call scenario:

- AP-A-to-AP-A Calls: Latency/Packet Loss will be measured across: Caller AP-A CPE, AT&T RAN network, AT&T mobile core network, AT&T IMS voice core network, AT&T mobile core network, AT&T RAN network, and callee AP-A CPE.
- APA-to-PSTN Call: Latency/Packet Loss will be measured across: Caller AP-A CPE, AT&T RAN network, AT&T mobile core network, and AT&T IMS voice core network. Latency across PSTN is much lower (*i.e.*, less than 20 ms) and cannot be measured using RTCP-XP.

AT&T will test AP-A for packet loss and latency using the technical performance counters and KPIs listed below. These metrics are consistent with the SIP PUBLISH (IETF RFC 3903) method, as proposed by the IETF SIPPING WG in an IETF draft, RTCP-XR Summary draft-ietf-sipping-rtcp-summary-06. AT&T currently monitors the following parameters:

	Metrics	**Description**
Packet Loss		
NLR	NetworkPacketLossRate (%)	The mean of the namesake metric, of which the definitions are provided in RTCP XR, RFC 3611, Sec 4.7.1. "NLR" EQUAL (1*3(DIGIT) ["." 1*2(DIGIT)]) ;percentage
Delay		
RTD	RoundTripDelay	The mean of that as defined in RTCP, RFC 3550. "RTD" EQUAL (1*5DIGIT) ;0-65535

OWD	MeanOneWayDelay	Defined in existing initial product requirements as the mean of the difference between NTP of each RTCP received and the local wall clock. "OWD" EQUAL (1*5DIGIT) ;0-65535

C. Result Reporting

AT&T will provide packet loss and latency testing results at an aggregated, all-customer level. AT&T will also report the number of calls placed over LTE, the number of calls placed over wireline broadband, the percentage of dropped calls and the percentage of blocked calls. AT&T will also provide separate aggregated results for each of the preceding metrics for calls placed during peak hours (weekdays 7pm – 11pm, local time).[23]

None of the information AT&T would submit as part of its testing results will constitute individually identifiable Customer Proprietary Network Information ("CPNI") or otherwise implicate Section 222 of the Communications Act or the Commission's implementing rules.[24] AP-A devices will report the measured data to the AT&T PMOSS operational support system via a SIP event package vq-rtcpxr-att using the SIP PUBLISH method. AT&T will submit official copies of the results of its performance testing to the Commission. AT&T will post its testing plan as well as its aggregate testing results at https://cpr.att.com/.

At the Commission's request, AT&T would make underlying test data available to the Commission in a manner that is compliant with requirements regarding the protection of CPNI.

[23] Tech Transitions Order app. B ¶ 18 ("Peak period is defined as weekdays 7 p.m. to 11 p.m. local time.").

[24] 47 U.S.C. § 222; 47 C.F.R. §§ 64.2001-2011; *see also* Tech Transitions Order app. B ¶ 22 (requiring compliance with these provisions to protect consumer personally identifiable information). To the extent any of the information used or accessed in the testing process would constitute individually identifiable CPNI, such use or access occurs to provide the service to the customer, as 47 U.S.C. § 222(c)(1) permits.

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