

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent of:     Maureen Brigid Gallagher  
U.S. Patent No.:    6,704,304           Attorney Docket No.: 35548-0131IP1  
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Appl. Serial No.:    09/588,248  
Filing Date:         June 6, 2000  
Title:                SELECTIVE ESTABLISHMENT OF  
                        TELECOMMUNICATIONS CONNECTIONS OVER PACKET  
                        AND CIRCUIT SWITCHED NETWORKS

**DECLARATION OF MR. PETER RYSAVY**

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I, Peter Rysavy, declare as follows:

## **I. ASSIGNMENT**

1. I have been retained as a technical expert by counsel on behalf of Huawei Technologies Co., Ltd. (“Huawei”). I understand that Huawei is requesting that the Patent Trial and Appeal Board institute an *inter partes* review (“IPR”) proceeding with respect to U.S. Patent No. 6,704,304 (the ’304 patent) (EX1001).

2. I have been asked to provide my independent analysis of the ’304 patent in light of the prior art publications cited in Section V below.

3. I am not, and never have been, an employee of Huawei. I received no compensation for this Declaration beyond my normal hourly compensation based on my time actually spent analyzing the ’304 patent, the prior art publications cited in Section V below, and issues related thereto, and I will not receive any added compensation based on the outcome of any IPR or other proceeding involving the ’304 patent.

## **II. QUALIFICATIONS**

4. I graduated with BSEE and MSEE degrees from Stanford University in 1979, with my master’s degree emphasizing communications technologies.

5. From 1988 to 1993, I was vice president of engineering and technology at Traveling Software (later renamed LapLink), at which projects included LapLink, LapLink Wireless, and connectivity solutions for a wide variety



of computing platforms. During this period, I was responsible for evaluating wireless communications technologies for use with the LapLink file transfer and synchronization product families. I also managed the development of a short-range wireless modem called LapLink Wireless that replaced a serial-data cable connection between computers. Prior to Traveling Software, I spent seven years at Fluke Corporation, where I worked on data-acquisition products and touch-screen technology.

6. I am now the president of the consulting firm Rysavy Research LLC and have worked as a consultant in the field of networking systems and wireless technology since 1993. As a consultant I specialize in wireless systems, including the wireline networking systems that support them. My work includes working with networking protocols at all layers of the protocol stack, including the TCP/IP family of protocols. One of my clients in 1994 was McCaw Cellular (which later became AT&T Wireless), the leading U.S. cellular company at the time. I did multiple projects for McCaw Cellular, helping me develop my expertise in networking technologies.

7. Beginning in 1994, I began teaching public courses, including courses that I taught at Portland State University, the University of California at Los Angeles, at conferences, and through my own organization. These courses included

content about cellular networks, Wi-Fi and other wireless local area networks, Bluetooth, paging, and mobile-application architectures.

8. Past projects have included reports on the evolution of networking technologies, evaluation of wireless technologies, strategic consultations, system design, articles, courses and webcasts, network performance measurement, test reports, and involvement in multiple patent litigation cases. I have analyzed and reported on telephony-oriented architectures, for example the IP Multimedia Subsystem and Wi-Fi Calling. My past and current clients include more than one hundred organizations.

9. I have written more than one hundred and ninety articles, reports, and papers, and have taught more than forty public courses and webcasts, on networking technologies. I have also performed technical evaluations of many networking technologies.

10. From 2000 to 2016, as part of my consulting practice, I was the executive director of the Portable Computer and Communications Association (PCCA), which was formally incorporated in May of 1993, then operated as the Wireless Technology Association. The PCCA's mission was to promote the interoperability of wireless-data systems, and its initial work was to develop interfaces between computers and wireless modems.

11. In the more than twenty-five years of my consulting career, I have studied or worked with nearly every major wireless technology related to cellular networks and wireless local-area networks, as well as the wireline networks associated with them. Further detail on my background and work experience, along with a list of my publications and the cases in which I have given testimony, is contained in my CV.

### **III. LEGAL PRINCIPLES**

12. In forming my analysis and conclusions expressed in this Declaration, I have applied the legal principles described in the following paragraphs, which were provided to me by counsel for the Petitioner.

#### **A. Anticipation**

13. I have been informed by counsel that a patent claim is invalid as “anticipated” if each and every element of a claim, as properly construed, is found either explicitly or inherently in a single prior art reference. Under the principle of inherency, I understand that if the prior art necessarily functions in accordance with, or includes the claimed limitations, it anticipates.

14. I have been informed by counsel that a claim is invalid if the claimed invention was known or used by others in the U.S., or was patented or published anywhere, before the Applicant’s invention. I further have been informed by counsel that a claim is invalid if the invention was patented or published anywhere,

or was in public use, on sale, or offered for sale in this country, more than one year prior to the filing date of the patent application (critical date). I have also been informed that a claim is invalid if an invention described by that claim was described in a U.S. patent granted on an application for a patent (or in a published application for a U.S. patent) that was filed by another in the U.S. before the date of invention for such a claim.

**B. Obviousness**

15. I have been informed that a patent claim is invalid as “obvious” in light of one or more prior art references if it would have been obvious to a person of ordinary skill in the art at the time of the alleged invention (“POSITA”), taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called “secondary considerations” of non-obviousness, which include: (i) “long felt need” for the claimed invention, (ii) commercial success attributable to the claimed invention, (iii) unexpected results of the claimed invention, and (iv) “copying” of the claimed invention by others.

16. While I do not know the exact date that the alleged invention claimed in the ’304 patent was made, I do know that the ’304 patent was filed on June 6, 2000. For purposes of my obviousness analysis, I have applied a date of June 6,

2000, as the date of the alleged invention, although in many cases the same analysis would hold true even if the date of the alleged invention were earlier.

17. I have been informed that a claim can be obvious in light of a single prior art reference or multiple prior art references. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason that would have prompted a POSITA to modify or supplement the single prior art reference, or to combine two or more references, in a manner that provides the elements of the claimed invention. This reason may come from a teaching, suggestion, or motivation to combine, or may come from the reference(s) themselves, the knowledge or “common sense” of a POSITA, or from the nature of the problem to be solved, and this reason may be explicit or implicit from the prior art as a whole. I have been informed that, under the law, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I also understand it is improper to rely on hindsight in making the obviousness determination.

### **C. Claim Construction**

18. I understand that, for purposes of my analysis in this *inter partes* review proceeding, the terms appearing in the patent claims should be interpreted according to their “ordinary and customary meaning,” which is often referred to as the *Phillips* standard. In determining the ordinary and customary meaning, I

understand that the words of a claim are first given their plain meaning that those words would have had to a person of ordinary skill in the art at the time of the alleged invention. I also understand that the structure of the claims, the specification and file history also may be used to better construe a claim insofar as the plain meaning of the claims cannot be understood. Moreover, I understand that even treatises and dictionaries may be used, albeit under limited circumstances, to determine the meaning attributed by a person of ordinary skill in the art to a claim term at the time of filing. Unless otherwise noted, I have applied the plain and ordinary meaning of the '304 patent's claim terms throughout my analysis.

Finally, I have been informed that, if a claim element recites the phrase "means for" followed by a recitation of function without any recitation of actual structure, the claim element is presumed to be a "means-plus-function" element that should be interpreted under 35 U.S.C. §112, ¶6. In such circumstances, the claim element would be interpreted to include the corresponding structure or actions (such as algorithms) described in the specification, and any equivalents thereof.

19. I also understand that the words of the claims should be interpreted through the lens of a POSITA at the time the alleged invention was made (not today). Because I do not know at what date the alleged invention was made, I have used the filing date of the '304 patent (June 6, 2000).

#### **IV. PERSON OF ORDINARY SKILL IN THE ART**

20. Based on my knowledge and experience in the field and my review of the '304 patent and its file history, I believe that a POSTIA would have had at least a Bachelor's degree in computer science, computer engineering, electrical engineering, or a related field, with 2-3 years of experience in the field of information or communication systems. *See* EX1001, Title (relates generally to "selective establishment of telecommunications connections over packet and circuit switched networks"). Such experience could be obtained through employment in a related industry. Experience can also be obtained through exposure to research literature through employment in the field of network communications. Advanced-level degrees can substitute for additional years of experience. For example, research and study in a graduate program could substitute for additional number of years of work experience in a related field. My analysis and conclusions as expressed herein are thus based on the perspective of a person of ordinary skill in the art having this level of knowledge and skill at the time of the alleged invention of the '304 patent.

## **V. MATERIALS CONSIDERED**

21. The analysis and conclusions set forth in this Declaration are informed by my educational background and experiences in the field (*see* Section II). Based on my above-described experience, I believe that I am considered to be an expert in the field. Also, as detailed above, I understand and know of the capabilities of a

POSITA as of June 6, 2000, and I taught, participated in organizations, and worked closely with many such persons whom I would consider to qualify as a POSITA in the field during that time frame.

22. In general, as part of my independent analysis for this Declaration, I have considered the following: the background knowledge/technologies that were commonly known to a POSITA before the earliest claimed priority date for the '304 patent; my own knowledge and experiences gained from my work experience in the field and related disciplines; and my experience in working with others involved in this field and related disciplines. In addition, I have analyzed the following publications and materials:

- EX1001 U.S. Pat. No. 6,704,304 to Gallagher et al. (“the ‘304 patent”)
- EX1002 File History of the '304 Patent
- EX1004 U.S. Pat. No. 6,064,653 to Farris (“Farris”)
- EX1005 U.S. Pat. No. 6,075,784 to Frankel et al. (“Frankel”)
- EX1006 U.S. Pat. No. 6,731,627 to Gupta et al. (“Gupta”)
- EX1007 U.S. Pat. No. 6,282,192 to Murphy et al. (“Murphy”)
- EX1008 U.S. Pat. No. 6,781,983 to Armistead (“Armistead”)

23. Although this Declaration refers to certain portions of the cited references for the sake of brevity, it should be understood that these citations are



examples, and that one of ordinary skill in the art would have viewed the references cited herein in their entirety and, for reasons detailed later, in combination with other references cited herein or cited within those references themselves. The references used in this Declaration, therefore, should be viewed as being cited and analyzed herein in their entirety.

## **VI. BACKGROUND OF THE '304 PATENT**

### **A. Technical Overview**

24. The '304 patent is generally directed to “selective establishment of telecommunications connections over packet and circuit switched networks.” EX1001, Title, 1:9-11. The '304 patent generally considers “how to use the combined resources of the Internet and the PSTN effectively.” *Id.*, 1:35-36. In particular, the '304 patent recognizes “when the Internet or some equivalent packet network becomes too heavily loaded, traffic should be moved to the Public Switched Telephone Network (parts of which may use ATM transmission) for new calls and, ideally, also for calls that are already in progress.” *Id.*, 1:39-46, 1:46-50 (“The prior art does not suggest a good arrangement for performing this type of movement.”).

25. In an attempt to resolve the issue above, the '304 patent introduces “a local packet access network” that “is used to access either a core packet network, such as the Internet, or the Public Switched Telephone Network (PSTN). EX1001,

1:51-55, FIG. 1 (below). In an embodiment, the '304 patent describes that the packet access network includes “interface circuits for interfacing with local customer stations, a common data and access controller (COMDAC), and a packet switch.” *Id.*, 2:10-13. Further, the '304 patent describes the COMDAC” as convert[ing] PCM signals generated by the interface circuits into packets, generally of the H.323 protocol used for transmitting voice over the Internet, for use by the packet switch.” *Id.*, 2:13-19. Moreover, the '304 patent describes the packet switch as “access[ing] a core packet network 25, such as the Internet, directly, and accesses the PSTN 32 via a PSTN gateway and an end office switch.” *Id.*

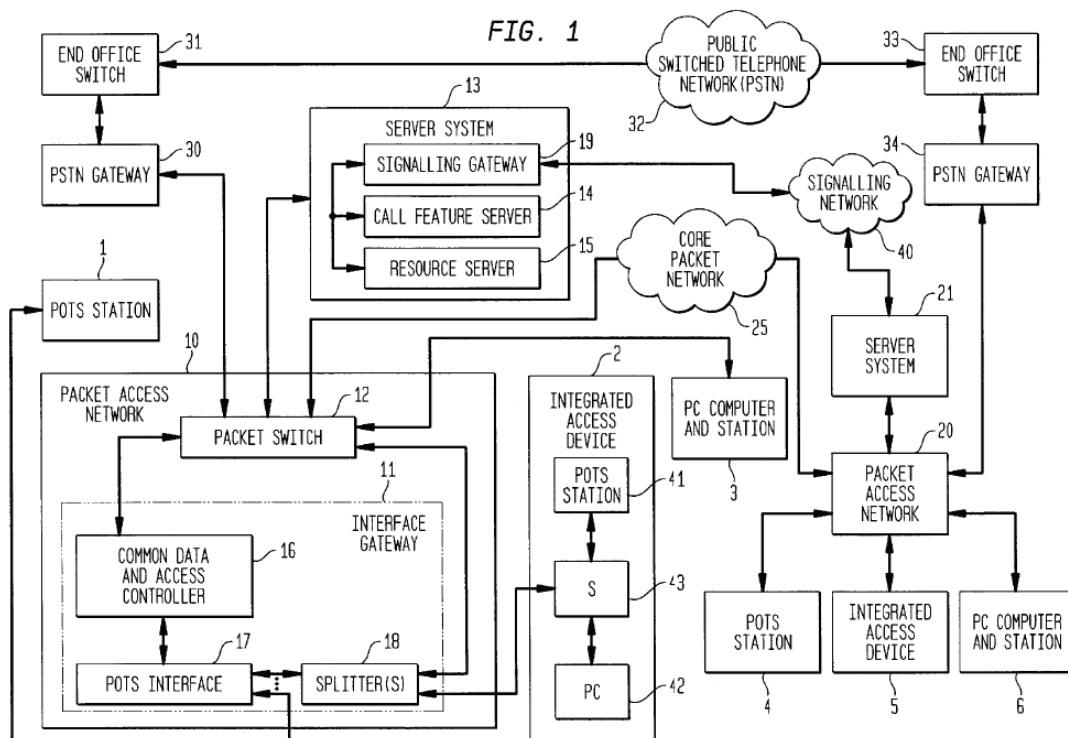


FIG. 1 of the '304 patent

26. In addition, the '304 patent states a server system for “check[ing] whether the call can be routed via the packet network, (Action Block 203),” “based on whether the core packet network can be expected to provide packet transmission that meets the quality requirements of the network.” EX1001, 4:1-6, FIG. 2. The '304 patent describes that, if the call is determined to be routed via the packet network, “the COMDAC or CPE, in cooperation with the server system, selects a route and attempts to route the call via the core packet network, (Action Block 207).” *Id.*, 4:10-15, FIG. 2. However, if “packet delay during the conversation” is excessive, “then the COMDAC or CPE causes the server system to switch the call to the PSTN.” *Id.*, 4:19-25, FIGS. 2-3.

#### **B. Summary Of File History**

27. As part of my preparation of this Declaration, I reviewed the file history of the '304 patent (EX1002). I understand that the application that led to the '304 patent was filed in the United States on June 6, 2000, and the patent issued on March 9, 2004. EX1001, cover page.

28. The examiner mailed one office action on August 13, 2003 rejecting all of the claims (claims 1-8) due to insufficient “antecedent basis” of a claim term. EX1002, 52-55. The office action indicated the claims would be allowed otherwise. *Id.*

29. I note the office action included no art-based rejection. There were six references were listed in a form titled “Notice of References Cited,” but there is no mention of these prior art references in any remarks from the examiner or the application. EX1002, 56. This form included Farris and Murphy in the list, which are analyzed in detail below in this Declaration. As demonstrated by my analysis of Farris and Murphy (below), the pertinent portions of these prior art teachings were never expressly addressed in the file history and were certainly never used in any rejection by the examiner or remarks of the applicant. EX1002.

30. The applicant submitted a response on November 16, 2003 with amendments to the claims for addressing insufficient antecedent bases as well as for clarifying certain recitations. EX1002, 57-61. From there, the examiner allowed the claims. *Id.*, 62-66.

31. Based on my review of the record, the pertinent references listed above—Farris, Frankel, Gupta, Murphy, and Armistead—were never analyzed in any remarks or rejection in an office action during prosecution. Based upon my knowledge and experience in this field and my review of the publications cited here, it is clear from a meaningful analysis of these references that at least claims 1, 3, and 7 of the ’304 patent are not patentable over the prior art. For example, each of Farris and Gupta anticipates claim 1 and particular dependent claims. Also, the predictable combination of the Frankel and Gupta references render

claims 1, 3, and 7 unpatentable for obviousness. Further, as explained below, dependent claim 3 is subject to first and second alternative constructions (neither of which was addressed by the examiner during prosecution). And even if dependent claim 3 is construed under a second alternative construction, this dependent claim 3 is nevertheless anticipated by Farris; rendered obvious by the predictable combination of Frankel, Gupta and Armistead; and rendered obvious by the predictable combination of Gupta and Murphy.

## **VII. OVERVIEW OF CONCLUSIONS FORMED**

32. This Declaration explains the conclusions that I have formed based on my independent analysis. To summarize those conclusions:

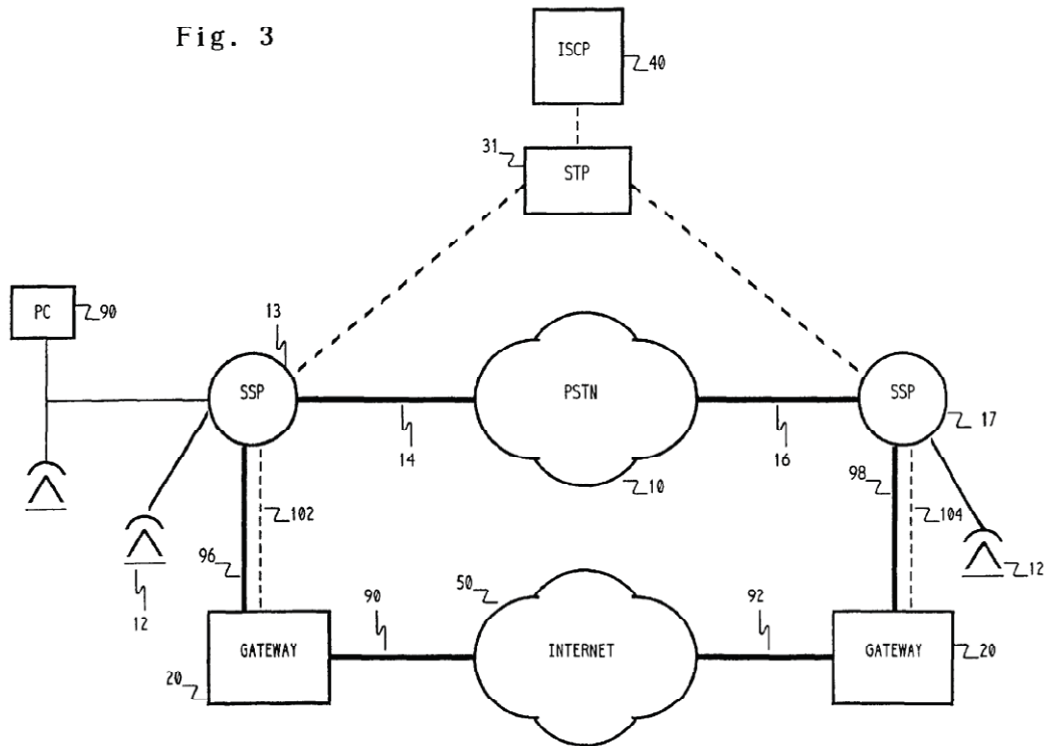
- Claims 1, 3, and 7 are anticipated by teachings of Farris.
- Claims 1, 3, and 7 are rendered obvious based on the teachings of the prior art combination of Frankel and Gupta.
- Claim 3 is rendered obvious based on the teachings of the prior art combination of Frankel, Gupta, and Armistead.
- Claims 1, 3, and 7 are anticipated by teachings of Gupta.
- Claim 3 is rendered obvious based on the teachings of the prior art combination of Gupta and Murphy.

## **VIII. OVERVIEW OF PRIOR ART REFERENCES**

**A. Farris**

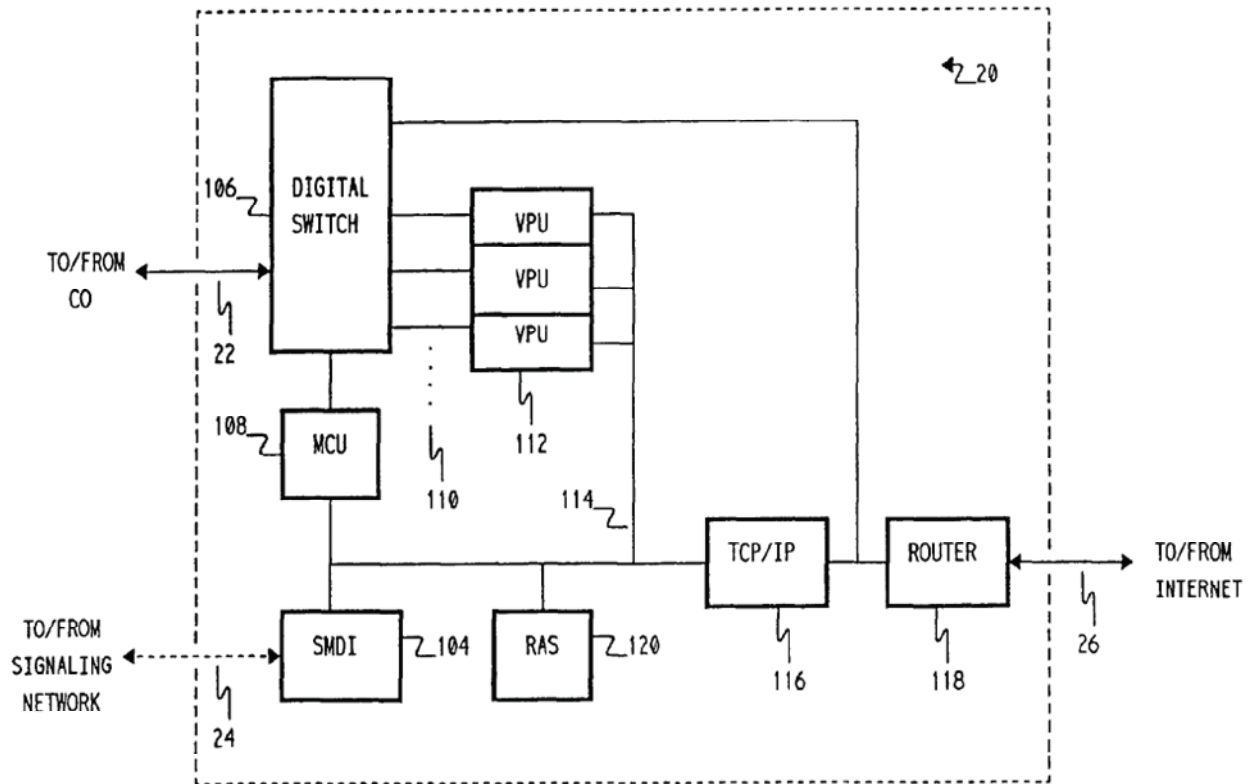
33. Farris is a granted patent that was filed on January 7, 1997 and issued on May 16, 2000 as U.S. Patent No. 6,064,653. EX1004, cover page. Farris generally pertains to “telecommunications networks” for “alternative routing of voice calls placed through a data internetwork” either through the Internet or the PSTN. *Id.*, 1:25-27, FIG. 1. Farris identifies problems of “unstable and unpredictable” traffic patterns “[w]ith increasing volume of use on the Internet and the bursty nature of data transmission.” *Id.*, 3:49-51. Farris purports to solve such problems by employing gateway servers and/or other network components for “continuously monitor[ing] the data traffic between two end nodes of a data internet-work.” *Id.*, 5:16-45. Farris’s solution converts calls to appropriate formats, such as TCI/IP packets, for digital transmission, and, based on the monitored data traffic and conditions, transmits the data via either the Internet or the PSTN. *Id.*, 5:16-45; *see also* 9:60-11:5.

34. FIG. 3 of Farris, reproduced below, illustrates a network including gateway servers 20 and SSP capable central offices 13, 17 that are connected to “subscribers customer premises equipment (CPE) such as telephone terminals 12 and PC 90.” EX1004, 8:52-9:3, FIG. 3.



*Id.*, FIG. 3.

35. FIG. 5 of Farris, reproduced below, describes that the gateway server includes a packet assembler/disassembler (PAD) 116 and a master control unit (MCU) 108. EX1004, 10:1-33, FIG. 5.



**Fig. 5**

*Id.*, FIG. 5. The PAD 116 “packetizes data on the LAN 114 into TCP/IP packets for transport onto the Internet.” *Id.*, 10:18-32. The MCU 108 “tracks traffic conditions on the Internet between the server and various remote servers.” *Id.*, 10:46-59. “If traffic conditions for communication with a particular remote location are unacceptable,” the MCU instructs the PAD 116 to reroute the “appropriately addressed packets at the output of TCP/IP [PAD] 116” back through the digital switch 106, and the rerouted packets are eventually transmitted to “the final destinations through the local PSTN.” *Id.*, 10:60-11:5.



36. For the reasons articulated in detail below, and based on my review of the '304 patent, file history, and the Farris reference cited here, it is clear that a POSITA would have readily understood that the teachings of Farris anticipate all the elements of claims 1, 3, and 7.

**B. Frankel**

37. Frankel is a granted patent that was filed on July 9, 1998 and issued on June 13, 2000, as U.S. Patent 6,075,784. EX1005, cover page. Frankel generally pertains to a “system and method of communicating voice and data via a local packet network (LPN) to and from a customer site.” *Id.*, Abstract, 3:55-63 (“a system and method for utilizing a local packet network (LPN) that supports a digital packet-based transport architecture, such as Digital Subscriber Line (DSL), to provide voice and optionally data services over a single local loop, such as a DSL, to a customer site.”)

38. In particular, FIG. 1 of Frankel, reproduced below, discloses “a control site within or connected to the LPN (such as a central switching facility),” and that the control site (or central switching facility) receives “voice-band packets, call control packets and data packets from the customer site” via the LPN. EX1005, 4:21-24. “The voice-band packets received from the customer site via the LPN” are switched to “a public switched telephone network (PSTN) switch” and transmitted to the PSTN, while “[d]ata packets received from the customer site are

coupled to a data switch for transfer to a data network (such as the Internet).” *Id.*, 4:24-30.

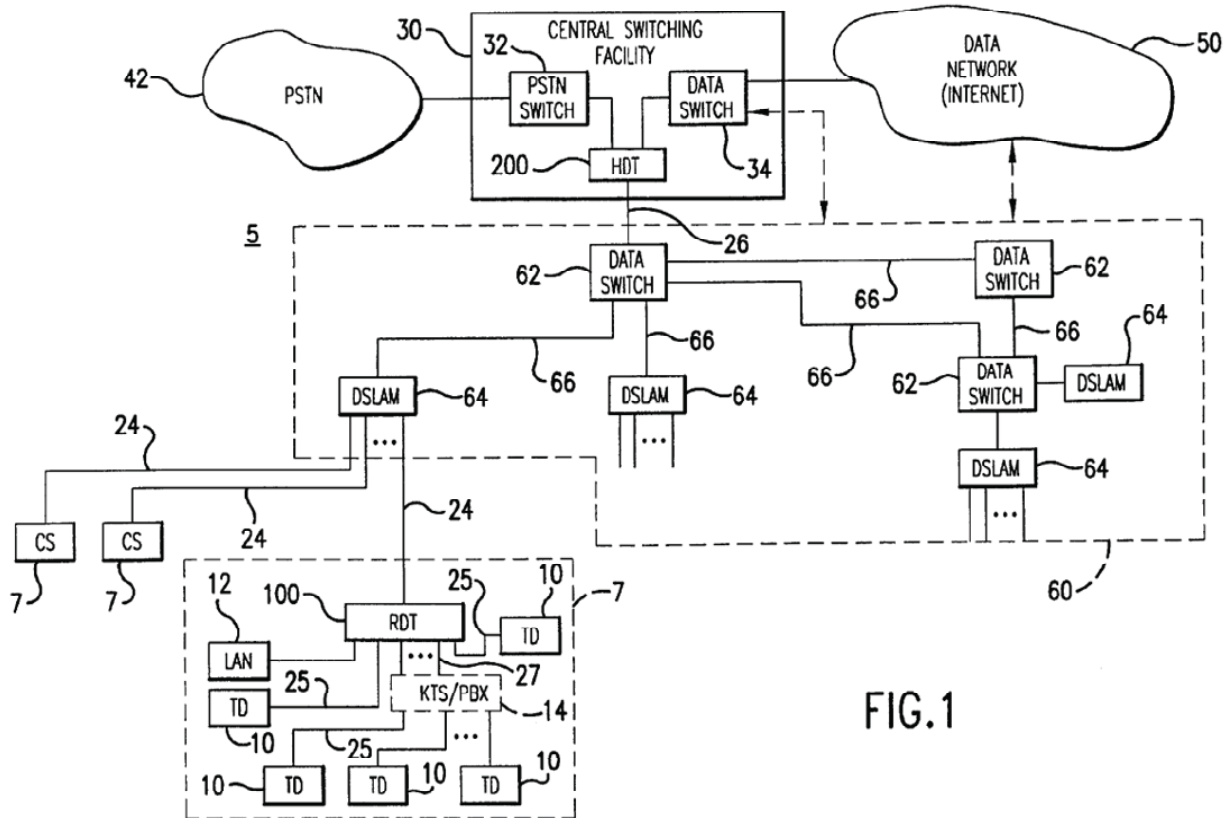


FIG. 1

*Id.*, FIG. 1.

39. As shown in FIG. 1 above, Frankel’s network includes a remote digital terminal (RDT) at the customer site, and a host digital terminal (HDT) at the central switching facility. EX1005, 4:39-43 (“a specialized apparatus called a remote digital terminal (RDT) is provided at the customer site and another specialized apparatus, called a host digital terminal (HDT) is provided at the central switching facility.”). “The RDT converts the voice-band packets suitable for communication over the LPN to and from analog telephone signals suitable for

use by attached telephone devices.” *Id.*, 4:49-53. Further, the HDT “resides at control site within or without the LPN” and “converts voice-band packets to and from a time-division multiplexed format suitable for communication via the PSTN switch.” *Id.*, 4:53-55, 6:18-19. In particular, the HDT is connected to the PSTN switch that “route[s] voice calls to the local PSTN.” *Id.*, 6:18-25. The HDT is further connected to the data switch that “route[s] data packets to and from a data network 50, such as the Internet.” *Id.*

40. For the reasons articulated in detail below, and based on my review of the '304 patent, file history, and the prior art references cited here, it is clear that a POSITA would have readily understood that the predictable modification of Frankel in view of other evidence (e.g., Gupta, discussed below) renders obvious all the elements of claims 1, 3, and 7.

### **C. Gupta**

41. Gupta is a granted patent that was filed on November 17, 1999 and issued on May 4, 2004, as U.S. Patent No. 6,731,627. EX1006, cover page. Gupta generally pertains to a “loop carrier system includes a home local area network having plural telephone modules and a hub coupled to in-home telephone wiring.” EX1006, Abstract. Gupta provides “a migration strategy that uses the broadband network for multiplexing efficiencies (which leads to significantly lower unit costs) and logical provisioning benefits (which leads to significant reduction in

service turn-up times) while continuing to leverage the PSTN's switching and service control engines (Class 4/5 switches, SCPs, etc.) for providing value-added services.” *Id.*, 1:58-65. Gupta achieves such a “low-risk migration” by employing “a gateway between the broadband network and the PSTN.” *Id.*, 1:65-67.

42. FIG. 1 of Gupta, reproduced below, illustrates a “virtual loop carrier system 10 which provides access to voice and data services.” EX1006, 4:61-66.

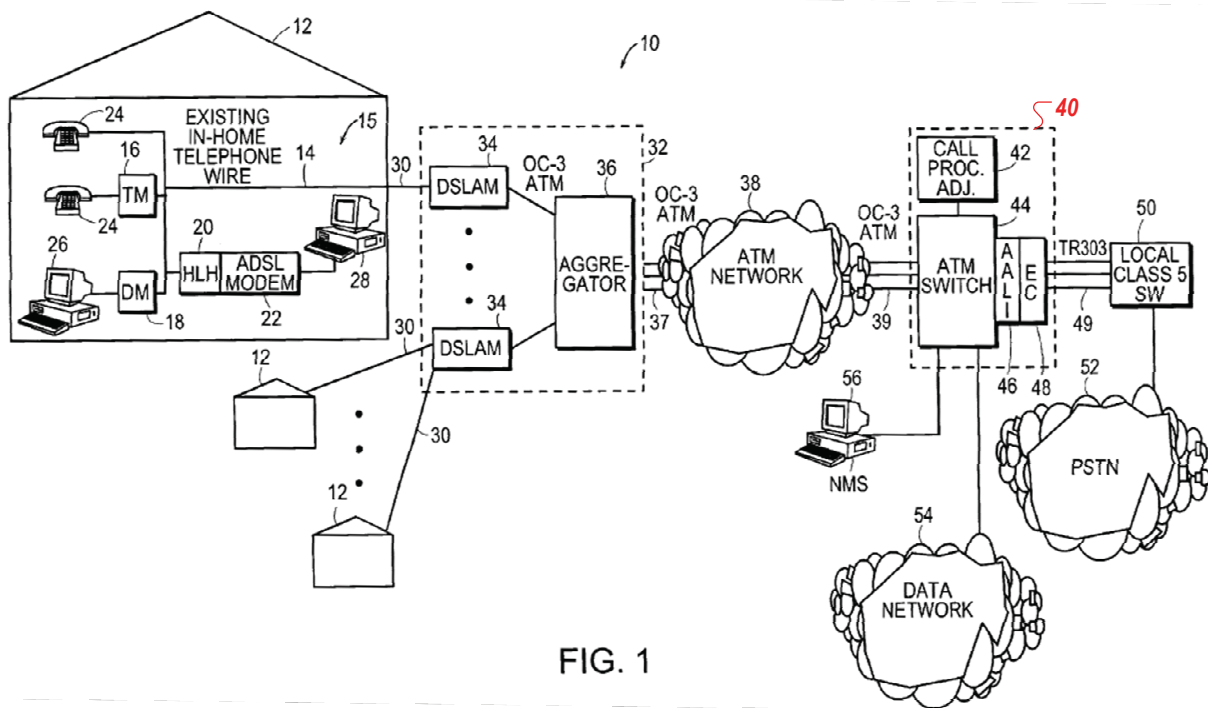


FIG. 1

*Id.*, FIG. 1 (annotated). The system 10 includes a home LAN hub (HLH) 20 coupled to telephone modules (TMs) 16 at a home LAN 15. *Id.*, 5:6-14. The TM “converts analog voice signals from a connected telephone 24 to digital signals in the form of pulse code modulation (PCM) samples.” *Id.*, 5:9-14. The HLH receives

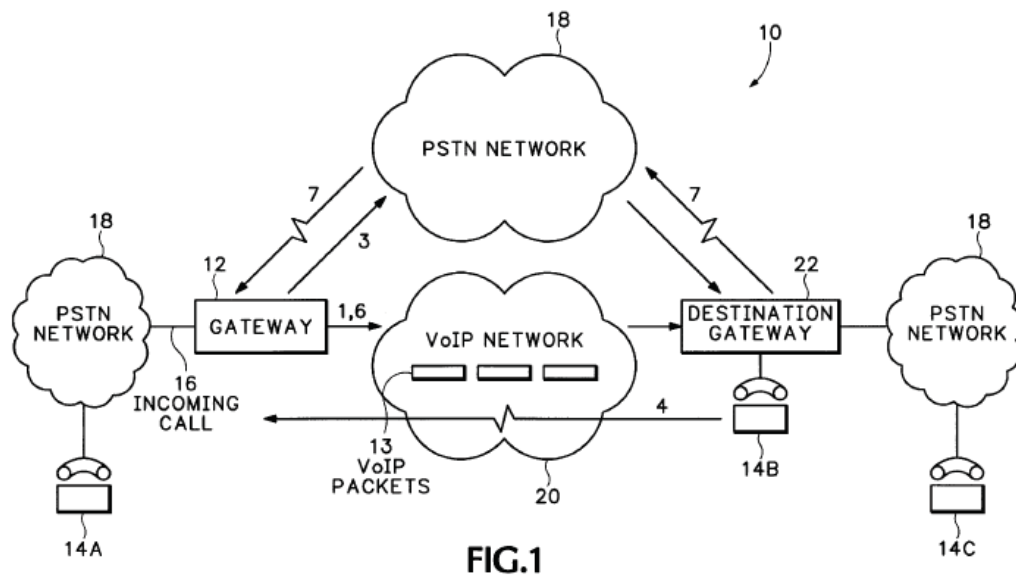
the PCM samples and “converts the PCM samples” into “ATM cells” or “IP packets.” *Id.*, 5:14-33, 2:8-28.

43. As illustrated in FIG. 1 above, the network in Gupta further includes a virtual loop gateway 40 that is controlled by a call processing adjunct (CPA) 42. EX1006, 5:43-59. The virtual loop gateway 40 is connected to the PSTN 52 (via the LDS 50) and the data network. *Id.*, 5:3-5 (“a virtual loop gateway (VLG) 40 which connects the voice and data between the ATM network 38 and a local digital switch (LDS) 50 [connected to the PSTN 52] or data network 54.”). The virtual loop gateway 40 operates to switch packets (e.g., ATM cells or IP packets) toward the PSTN 52 and the data network 54. *Id.*, 5:43-59, 34:11-48, 1:65-67, 2:33-41, 4:64-66 (“an exemplary virtual loop carrier system 10 which provides access to voice and data services in accordance with the present invention.”), 5:3-5, 6:9-45 (describing the HLH manages voice and data differently by converting PCM voice signals to ATM cells while converting data signals to Ethernet frames). For the reasons articulated in detail below, and based on my review of the ’304 patent, file history, and the Gupta reference cited here, it is clear that a POSITA would have readily understood that the teachings of Gupta anticipate all the elements of claims 1 and 7 and furthermore render obvious dependent claim 3 (viewed in combination with Murphy).

#### **D. Murphy**

44. Murphy is a granted patent that was filed on May 9, 2000 and issued on August 28, 2001, as U.S. Patent No. 6,282,192. EX1007, cover page. Murphy is generally pertains to a “call fallback scheme” that establishes a fallback call over a circuit switched network “[w]hen a low quality of service condition is detected on the VoIP link with the destination endpoint.” *Id.*, Abstract.

45. Murphy discloses a similar network architecture to those of the '304 patent and Farris. For example, as illustrated in FIG. 1 below, Murphy provides “a communication network 10 that includes a PSTN network 18 and a Voice over Internet Protocol (VoIP) network 20.” EX1007, 2:60-3:6. As recognized in Murphy, it has been well established that the VoIP network is a packet switched network. *Id.*, 2:67-3:2 (“The VoIP network 20 is an Internet Protocol (IP) packet switched network.”).



*Id.*, FIG. 1. The call fallback scheme in Murphy is provided in a packet switched

network over which “a Voice over IP (VoIP) link is established for incoming calls.” *Id.*, 1:64-67. Murphy describes that the incoming calls are converted to VoIP packets that are “sent over the VoIP link to the destination endpoint.” *Id.*, 1:67-2:2, 3:18-34.

46. In addition, Murphy describes problems of using the packet switched network (VoIP network) for calls, which are similar to those identified in the ’304 patent and Farris. EX1007, 2:2-16 (“When a low quality of service condition is detected on the VoIP link with the destination endpoint, a fallback call is established with the destination endpoint over a circuit switched network. The VoIP packets for the incoming calls are redirected from the VoIP link to the circuit switched data link.”), 3:18-42. To address such problems, Murphy’s gateway provides a Dial on Demand Routing (DDR) controller including a congestion detector 126. The congestion detection “detects IP network congestion by monitoring VoIP packets for IP addresses that are associated with VoIP link 111,” and “can also observe RTCP [Real Time Control Protocol] reports for IP addresses to determine if there is excessive packet delay, packet loss, or packet jitter.” *Id.*, 7:55-8:43.

#### **E. Armistead**

47. Armistead is a granted patent that was filed on May 3, 1999 and issued on August 24, 2004, as U.S. Patent No. 6,781,983. EX1008, cover page.

Murphy is generally pertains to a packet voice switch that “allows calls to be routed between a circuit-switched connection at circuit-switched interface 74” or “a packet-switched connection at packet-switched interface 76.” *Id.*, Abstract. Call routing for calls can be selected “based on a comparison of the current quality of service for the call over the packet-switched connection vs. the extra cost of connecting the call over the circuit-switched connection.” *Id.*

48. As illustrated in FIG. 3 below, Armistead provides a network topology for routing calls, which is similar to that of the '304 patent, by using a “packet voice switch” (or “packet voice gateway”) to “provide a more uniform quality of service by providing a mechanism for re-routing calls from a packet-switched connection to a circuit-switched connection, and preferably, from a circuit-switched connection to a packet-switched connection.” EX1008, 2:2-29, 3:34-47 (“Each gateway may serve only as a gateway to the packet switched network with no direct circuit-switching function, or it may serve also as a circuit switch operating between a local circuit-switched network and circuit-switched network.”).



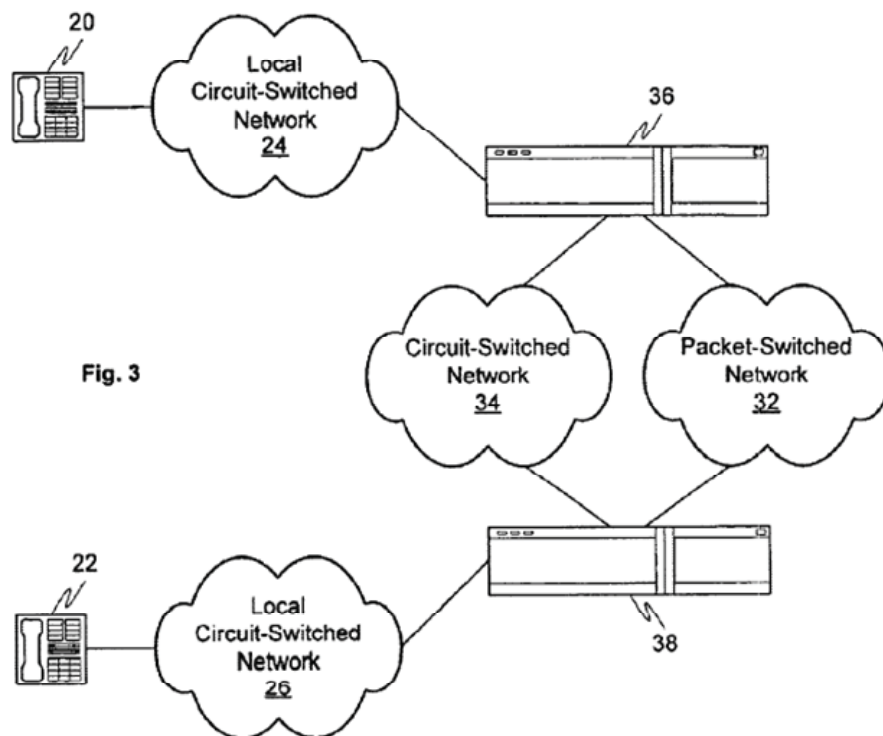


Fig. 3

*Id.*, FIG. 3.

49. Armistead discloses latency monitoring and routing schemes similar to those of the '304 patent. For example, Armistead states that the gateway gathers “[r]ound trip latency” or other information to determine “which network path is most desirable.” EX1008, 7:4-24. Armistead further describes that “the gateway examines a time-filtered estimate of latency and computes a packet-switched figure of merit [FOM].” *Id.*, 7:35-44. In particular, “[i]f the packet-switched FOM drops below the circuit-switched FOM for the call, the initiating gateway attempts a parallel connection to the remote gateway over the circuit-switched network,” and “the voice data is re-routed over the circuit-switched connection.” *Id.*, 7:35-58.

## IX. CLAIM CONSTRUCTIONS

50. I have been asked to provide my interpretation of the following term of the '304 patent set forth below. In providing the following interpretations, I have carefully considered and applied the claim construction standard referred to in ¶¶18-19 above. Additionally, I have been informed that the '304 patent is the subject of litigation in federal district court in which the parties have submitted preliminary claim constructions.

51. In this Declaration, it is clear that the above-cited prior art grounds can be readily compared to independent claim 1 according to the plain and ordinary meaning of the recited claim elements—without a need for a formal claim construction in claim 1. Regarding dependent claim 3, I note that this claim recites the phrase “means for” followed by a recitation of function (“determining whether a call should be routed over said PSTN or said core packet network”) without any recitation of actual structure. Accordingly, the element of dependent claim 3 is a “means-plus-function” element interpreted under 35 U.S.C. §112, ¶6. In such circumstances, the claim scope includes the corresponding structure or actions described in the specification, and any “equivalents thereof.” Here, I address first and second alternative claim constructions for the “means for determining whether a call should be routed over said PSTN or said core packet network” recited in dependent claim 3, but I also demonstrate below why this element of claim 3 is disclosed by the prior art under either construction.

52. Under a first alternative construction of dependent claim 3, the recited function is “determining whether a call should be routed over said PSTN or said core packet network,” and the corresponding structure described in the ’304 patent specification is the “call feature server.” EX1001, 3:16-27, 2:35-41. The ’304 patent describes the “call feature server” as “analyzing this dialed input from the resource server 15 and combining it with customer data from the customer database and network routing information from a network routing database, to determine where the call should be terminated and how the call should be routed.” *Id.*, 3:16-27; 2:35-41. As detailed below, under this first alternative construction, dependent claim 3 is not patentable based on at least the following Grounds: anticipated by teachings of Farris; and rendered obvious based on the teachings of the prior art combination of Frankel and Gupta.

53. Under a second alternative construction of dependent claim 3, based on my review of the ’304 patent, the recited function is “determining whether a call should be routed over said PSTN or said core packet network,” and the corresponding structure in the ’304 patent specification is the “server system” programmed to execute a known network algorithm. EX1001, 4:1-10, 1:55-62, 4:19-25, FIG. 2 (blocks 203 and 205). In particular, the ’304 patent describes that the “server system” performs the algorithm for “check[ing] whether the call can be routed via the packet network” according to a decision “based on whether the core

packet network can be expected to provide packet transmission that meets the quality requirements of the network,” and when “the server recognizes that the packet network connection is less economical than a PSTN connection, the result of this check would also be negative.” *Id.*, 4:1-10, FIG. 2 (blocks 203 and 205); *see also* 1:55-62, 4:19-25. As detailed below, under this second alternative construction, dependent claim 3 is not patentable based on at least the following Grounds: anticipated by teachings of Farris; rendered obvious by Frankel, Gupta and Armistead; and rendered obvious by Gupta and Murphy.

54. For the reasons articulated below, based on my knowledge and experience in this field and my review of the cited references, dependent claim 3 is unpatentable under either of the first and second alternative constructions.

## **X. ANALYSIS OF FARRIS**

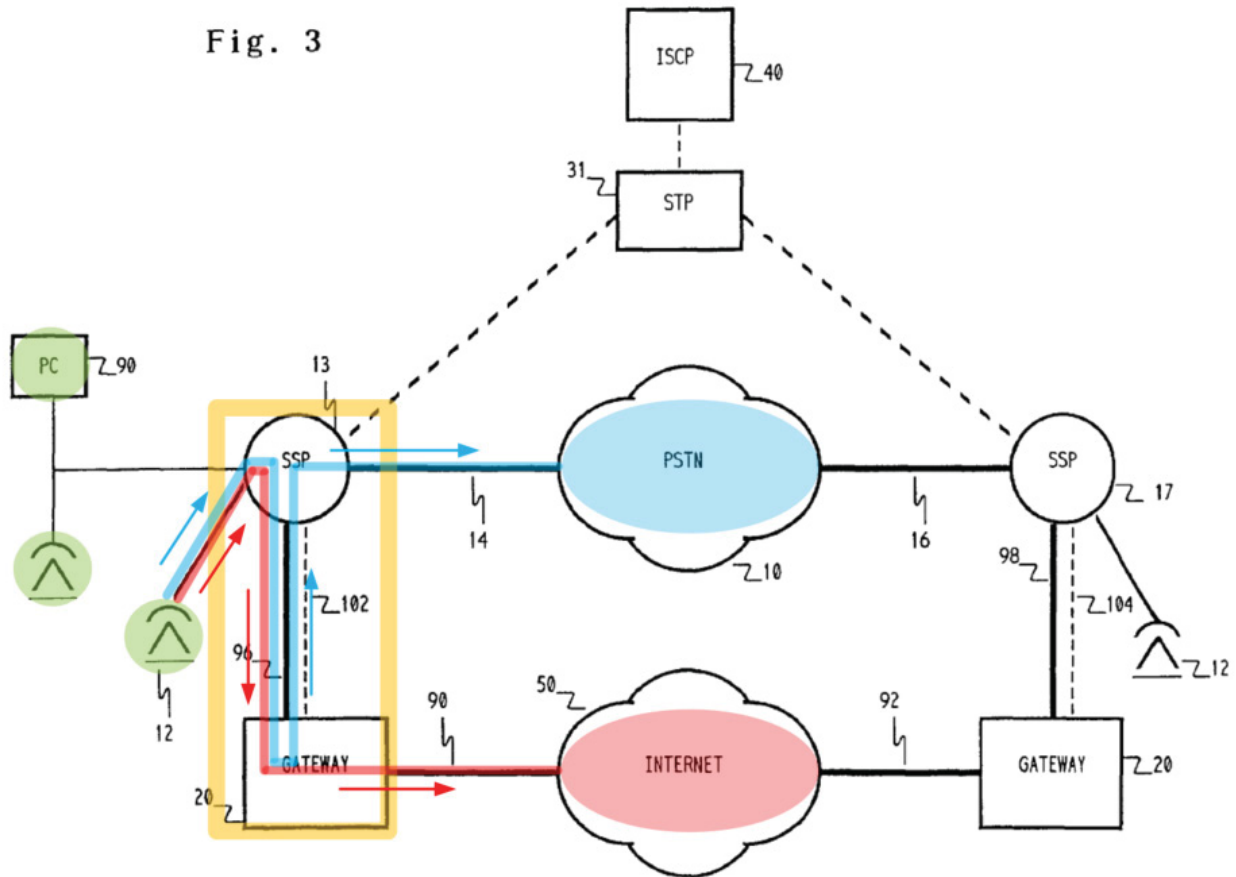
***[1.P] In a telecommunications network, comprising a core packet network and a circuit public switched telephone network (PSTN), apparatus for establishing a telecommunications connection comprising:***

55. Farris discloses each of the features of the preamble of claim 1. For example, Farris describes “telecommunications networks” and relates “particularly to alternative routing of voice calls” between “the packet switched telephone network (PSTN) and a data packet network, such as the Internet.” EX1004, 1:25-27, 8:52-61, 4:13-15. Farris describes one or more apparatuses in the network,

including service switching points central offices and gateways, which operate to establish a telecommunications connection via the PSTN and the Internet. *Id.*, 8:52-9:21 (“SSP capable central offices 13 and 17” or “SSPs 13 and 17,” and “gateway 20”), FIG. 3.

***[1.1] a packet access network connectable to a plurality of customer telephone stations; and***

56. Farris discloses this element. As shown in FIG. 3 below, Farris discloses a network (a yellow box) that is connected to “subscribers customer premises equipment (CPE) such as telephone terminals 12 and PC 90.” EX1004, 8:64-66. The network includes the SSP capable central office 13 and the gateway 20 connected to the central office 13. *Id.*, 9:11-12 (“Each of the central office SSPs



Annotated FIG. 3 of Farris

57. As shown in FIG. 3, Farris primarily illustrates “SSP capable central office” and “gateway” as two separate components. EX1004, 9:11-12. I note that Farris provides an alternative embodiment that the gateway is incorporated within the SSP capable central office. *Id.*, 9:12-14 (“the gateway hardware may be situated at the central office and associated with the switching system.”). As such, the network (the yellow box in FIG. 3 above) can alternatively be implemented as a single system or apparatus.

58. Farris's network including the SSP central office and the gateway (the yellow box in FIG. 3 above) is understood as the packet access network because the network provides access to a packet network (e.g., the Internet). I note that Farris's network (including the SSP central office 13 and the gateway 20) allows telephone terminals 12 to selectively access the Internet (i.e., packet network) or the PSTN. EX1004, FIG. 3, 8:52-9:3, 9:11-21, 5:37-41. Moreover, the network (including the gateway 20) includes several components for accessing the packet network. *Id.*, 10:18-20 ("The compressed communication data is output to a local area network (LAN) 114, for example an Ethernet-based network at 100 mbs."), 10:23-26 ("The LAN 114 transports data packets to a packet assembler/disassembler (PAD) 116 that packetizes data on the LAN 114 into TCP/IP packets for transport onto the Internet.").

**[1.2] a server system;**

59. Farris discloses the claimed server system. For example, Farris describes a server system or platform that implements the gateway 20. EX1004, 9:40-45 ("Each telephone system also is coupled to a respective gateway 20a-20c that functions as an Internet telephony interface and *server*, providing an interface between the corresponding telephone system 10 and the Internet. It is to be understood that the use of the term "gateway" may be variously described as an Internet module or interface, *gateway server*, or gateway router.") (emphasis

added); *see also* EX1004, 5:37-42 (“Incoming calls are appropriately formatted for digital transmission, including compression when applicable, by the **gateway servers** and multiplexed for transmission either through the data network or back through an ISDN channel or the like through the PSTN.”) (emphasis added).

60. Farris further discloses several components (e.g., a master control unit (MCU) 108) that constitute the server system discussed below with respect to element [1.6].

***[1.3] said packet access network comprising an interface gateway and a packet switch;***

61. Farris discloses this element. First, Farris’s network (yellow box in FIG. 3 above), which corresponds to the packet access network, includes one or more elements that constitute the interface gateway of the ’304 patent. *See* ¶¶67-72 (element [1.5]). Further, the gateway included in Farris’s network operates as an interface. EX1004, 9:39-45 (“Each telephone system also is coupled to a respective **gateway** 20a-20c that functions as an Internet telephony **interface** and server, providing an **interface** between the corresponding telephone system 10 and the Internet. It is to be understood that the use of the term “**gateway**” may be variously described as an Internet module or **interface**, gateway server, or gateway router.”) (emphasis added).

62. I note that the ’304 patent illustrates in FIG. 1 that the interface gateway includes the “common data and access controller (COMDAC) 16” for



converting signals to packets. EX1001, 2:13-23, FIG. 1 (dashed block “11”). I also note that the ’304 patent provides no other description of the “interface gateway” other than the dashed box “11” in FIG. 1.

63. Notably, Farris’s gateway 20 includes components that correspond to the COMDAC 16 of the ’304 patent. In particular, Farris discloses that the gateway includes the “packet assembler/disassembler (PAD) 116” that converts signals to packets. EX1004, 10:23-26 (“The LAN 114 transports data packets to a packet assembler/disassembler (PAD) 116 that packetizes data on the LAN 114 into TCP/IP packets for transport onto the Internet.”).

64. Second, Farris’s network (i.e., the packet access network) further includes one or more elements that match the packet switch of the ’304 patent. *See* ¶¶65-66 (element [1.4]). I note that the ’304 patent describes the packet switch as “accessing said PSTN and said core packet network.” EX1001, 2:16-19, 3:36-38; *see also* element [1.4] below. As described below (element [1.4]), Farris discloses the “packet assembler/disassembler (PAD) 116,” the “master control unit (MCU) 108,” and the “router 118,” which function, individually or in combination, as the packet switch of the ’304 patent. EX1004, 10:60-11:5.

***[1.4] said packet switch for accessing said PSTN and said core packet network;***

65. Farris discloses the claimed packet switch. For example, Farris discloses at least the “packet assembler/disassembler (PAD) 116,” the “master

control unit (MCU) 108,” and/or the “router 118,” which, either individually or in combination, operate to access the PSTN and the Internet. EX1004, 10:23-28, 10:39-46, 10:60-11:5, 11:18-33, FIG. 5 (below).

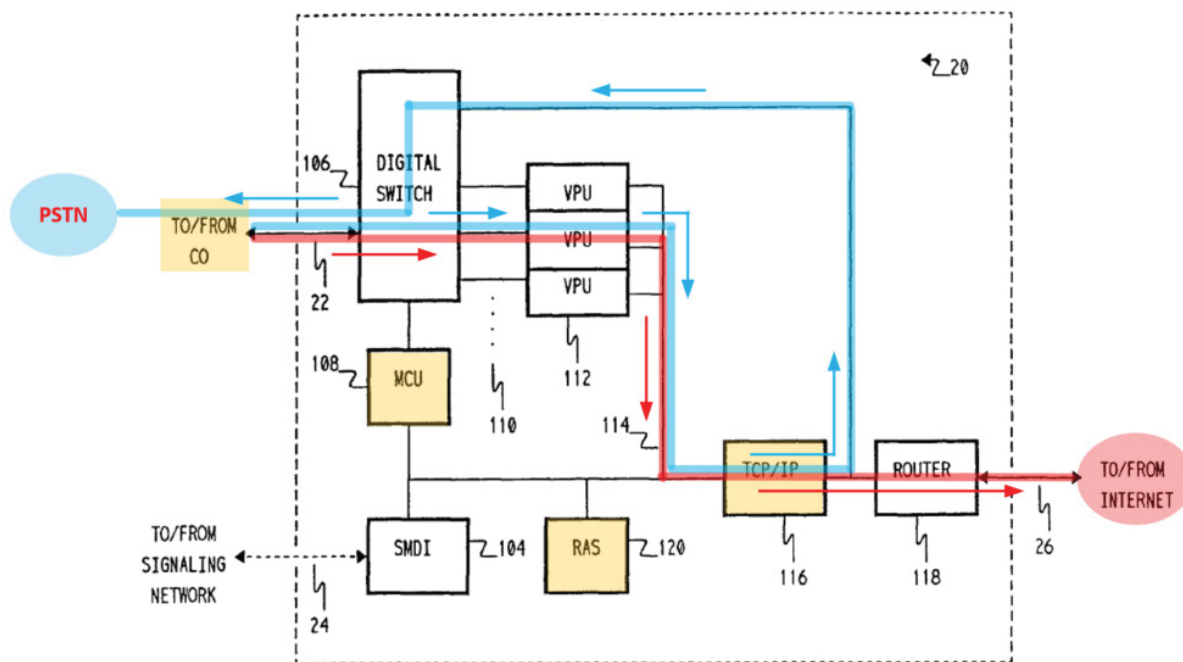


Fig. 5

Annotated FIG. 5 of Farris

66. Farris discloses that, “[u]nder direction of the MCU,” the PAD 116 switches packets to either the Internet (via the router 118) or the PSTN based on “traffic conditions for communication with a particular remote location.” EX1004, 10:60-11:5. As depicted in FIG. 5 above, the PAD 116 transmits packets toward the Internet via the router 118 along the red line from the PAD 116. Alternatively, the PAD 116 transmits packets toward the PSTN along the blue line from the PAD

116. *Id.*, 10:60-11:5 (“If traffic conditions for communication with a particular remote location are unacceptable, the MCU will signal the PSTN network to set up one or more ISDN or T1 pipeline connections between the gateway and the server at the remote location. Under direction of the MCU, appropriately addressed packets at the output of TCP/IP 116 destined for the remote server will be multiplexed and rerouted back through digital switch 106 through the pipeline to the remote server. The remote server will process packets thus received over the pipeline as it would with received Internet traffic, i.e., demultiplex the incoming stream, decompress the data signals, and transmit to the final destinations through the local PSTN.”), 10:23-28, 10:39-46, 11:18-33.

***[1.5] said interface gateway comprising circuits for converting signals from said plurality of customer telephone stations to packets for switching by said packet switch;***

67. Farris discloses this claimed element of the interface gateway. For example, Farris discloses that the SSP capable central office 13 and the gateway 20, either individually or in combination, provide the “circuits for converting signals from said plurality of customer telephone stations to packets for switching by said packet switch.”

68. Farris generally describes various components of the gateway 20 that correspond to “circuits” as illustrated in FIGS. 6 and 7. *See e.g.*, EX1004, 11:6-40 (“multi-tasking central processing unit (CPU) 174,” “T1 circuit”), 11:54-12:56

(“BRI or PRI type ISDN line circuits.” “each ISDN line circuit,” “T1 (or T3) circuit”).

69. In particular, Farris discloses that the SSP capable central office 13 performs “conversion of analog voice [from a telephone] to digital signals.” EX1004, 8:67-9:2. As illustrated in FIG. 5 (below), the digital signals from the SSP capable central office are then transmitted to the gateway 20, in particular to the digital switch 106 and the voice processor unit (VPU) 112, and eventually converted into TCP/IP packets at the packet assembler/disassembler (PAD) 116. *Id.*, 10:1-26; *see also* 10:10-26 (“The LAN 114 transports data packets.”).

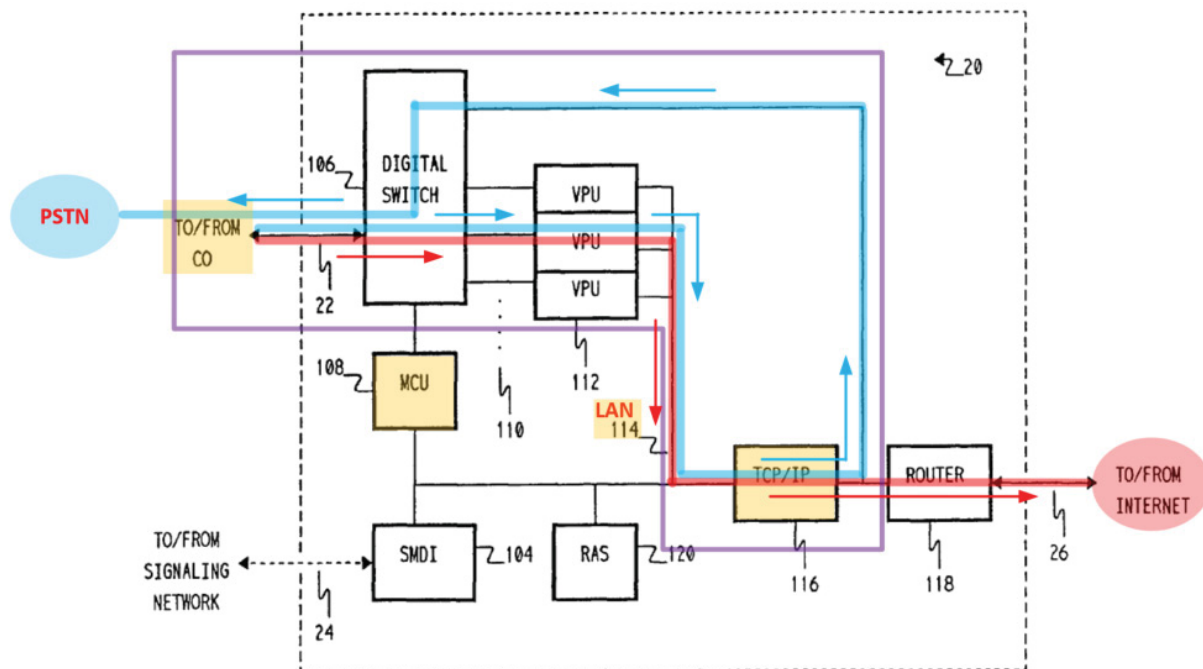


Fig. 5

Annotated FIG. 5 of Farris

70. I note that the '304 patent does not describe the structure of the claimed “circuits” except that the “common data and access controller (COMDAC) 16” is identified as converting signals from the customer telephone stations to packets. EX1001, 2:13-23. Again, Farris plainly discloses elements that match the functionality of the COMDAC described in the '304 patent. *See above* ¶¶69.

71. Based on my knowledge and experience in this field and my review of Farris and the '304 patent, therefore, a POSITA would have readily recognized that Farris clearly discloses that at least part of the SSP capable central office and the gateway, including the digital switch 106, the VPU 112, the LAN 114, and/or the PAD 116, provide “circuits for converting signals from said plurality of customer telephone stations to packets,” as depicted, for example, in a purple box in FIG. 5 above. EX1004, 8:67-9:2, 9:12-14, 10:1-26.

72. Further, the structures in the “circuits” of Farris convert the signals for “switching by said packet switch.” In particular, Farris discloses that the packets converted at the PAD 116 are switched toward the Internet or the PSTN by the PAD 116 and/or the MCU 108. EX1004, 10:60-11:5.

***[1.6] said saver [sic] system for controlling connections through said packet switch.***

73. Farris discloses the claimed server system by at least part of the gateway in Farris. For example, Farris discloses the “master control unit (MCU) 108 that controls the overall operations of the gateway.” EX1004, 10:4-6. More

specifically, Farris describes that the MCU instructs the PAD 116 (i.e., packet switch) to switch the packets that are output from the PAD 116, either toward the Internet through the router 118, or toward the PSTN by rerouting back through the digital switch 106. EX1004, 10:23-26 (“The LAN 114 transports data packets to a packet assembler/disassembler (PAD) 116 that packetizes data on the LAN 114 into TCP/IP packets for transport onto the Internet.”); 10:60-11:5 (“Under direction of the MCU, appropriately addressed packets at the output of TCP/IP 116 destined for the remote server will be multiplexed and rerouted back through digital switch 106 through the pipeline to the remote server. The remote server will process packets thus received over the pipeline as it would with received Internet traffic, i.e., demultiplex the incoming stream, decompress the data signals, and transmit to the final destinations through the local PSTN.”).

74. Further, Farris discloses that the MCU 108 is implemented in a server. In particular, as discussed above (element [1.2]), Farris describes that the gateway 20 functions as a server, and the MCU 108 is included in the gateway 20. EX1004, 9:39-46 (“It is to be understood that the use of the term “gateway” may be variously described as an Internet module or interface, gateway server, or gateway router.”), 9:60-62 (“FIG. 5 is a block diagram of a preferred embodiment of gateway 20 that comprises a combined telephony and Internet server platform.”), FIG. 5. Accordingly, Farris discloses the server system (e.g., the MCU and/or other

components being part of the gateway server) “for controlling connections through said packet switch” (e.g., the PAD). *See also* EX1004, 11:40-13:50, FIG. 7.

***[3] The apparatus of claim 1, wherein said server system comprises means for determining whether a call should be routed over said PSTN or said core packet network.***

75. Farris discloses this element of claim 3 under at least the first alternative construction of the “means for” term. As discussed above in Section IX, I note that, under this potential construction, the scope of this “means for” element in claim 3 includes the “call feature server” and “equivalent thereof.” *See* ¶52.

76. Based on my review of the ’304 patent and Farris, Farris discloses several features that amount to the corresponding structure of the “call feature server” or “equivalents thereof.” In particular, Farris describes that the gateway includes one or more elements that amount to the “call feature server.” For example, Farris’s gateway includes “an ***RAS [routing and administration server] database*** 120 that is an image of the database in the RAS server 30.” EX1004, 10:34-35 (emphasis added). Further, Farris discloses the RAS server, “linked to the Internet, includes a ***routing and administration database*** for managing ***call routing translations*** and user access permissions.” EX1004, 9:52-59, FIG. 4. Farris further discloses that “[t]he routing and administration database stores ***records for every area code/NNX*** served by a telephony system 10, along with the

*network address* for the corresponding gateway 20.” *Id.*, 9:56-59 (emphasis added).

77. Farris further describes that the gateway 20 performs “a number of *call processing function routines* 191 for processing incoming and outgoing calls.” EX1004, 11:54-67 (emphasis added), FIG. 7 (below). In addition, Farris states:

Subroutine 197 is provided for collection of *digits input by users*. The digits typically arrive via D channel signal processing routine 199, but digits may be received as dual tone multifrequency *signals* contained in the B channel voice frequency information or T1 line. The combination of prompts 195 and digit collection permits a number of interactive call processing services. For example, in some situations it may be desirable to prompt a caller for input of a PIN, or credit card information, and collect and check received digits before processing a call.

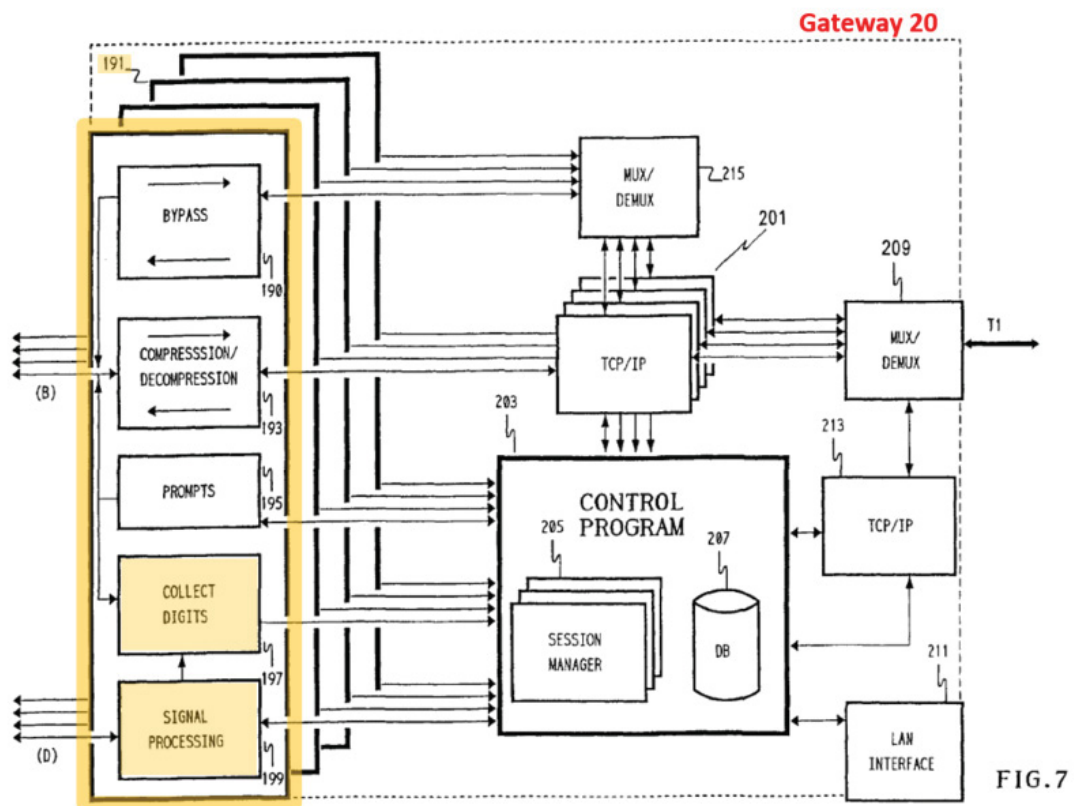
The signal processing routine 199 provides two-way ISDN signaling via the D channel of each ISDN line circuit. The D channel carries standard ISDN call related signaling messages. For example, *incoming signals* may indicate a new incoming call on one of the associated B channels and identify the call as a data call or a voice call. The *signals* for such a call may include the *dialed number* as well as *a number associated with the origin of the call*.

The software running on the gateway computer includes a control program 203. Such control program includes high level control software, session managers 205 and one or more databases 207 storing



relevant control information. The control program 203 activates one session manager routine 205 for each call in progress. The session manager receives and processes various signals from the call processing function routines 191 and provides the necessary instructions to the routines to *execute each individual call processing function*. The control program 203 also controls or administers TCP/IP addressing functions and initiates certain necessary signaling communications through the Internet.

EX1004, 12:8-39 (emphasis added).



Annotated FIG. 7 of Farris

78. Based on my review of Farris and the '304 patent, Farris's server system (e.g., at least part of the gateway 20) discloses the "call feature server"

(e.g., call processing function routines 191) for analyzing customer dialed information (e.g., digits input by users) from the resource server (e.g., routing and administration server (RAS)) and combining it with customer data (e.g., dialed number, number associated with the original of the call, records for every area code/NNX, etc.) and network routing information (e.g., routing and administration database), in order to determine the routing of a call, as disclosed in the '304 patent. EX1001, 2:35-41, 3:16-27.

79. As discussed above in Section IX, I note that, under the second construction, the “means for” term includes the “server system” that performs the network algorithm of “check[ing] whether the call can be routed via the packet network” according to a decision “based on whether the core packet network can be expected to provide packet transmission that meets the quality requirements of the network,” and when “the server recognizes that the packet network connection is less economical than a PSTN connection, the result of this check would also be negative,” and equivalents thereof. *See* ¶53.

80. Under the second claim construction, Farris discloses the corresponding structure of element [3] or equivalents thereof. For example, Farris describes that the MCU in the gateway “controls the overall operations of the gateway” and monitors “traffic conditions on the Internet” such as “*response time*, percentage utilization, *packet forwarding rate*, *throughput*, *errors per second*,

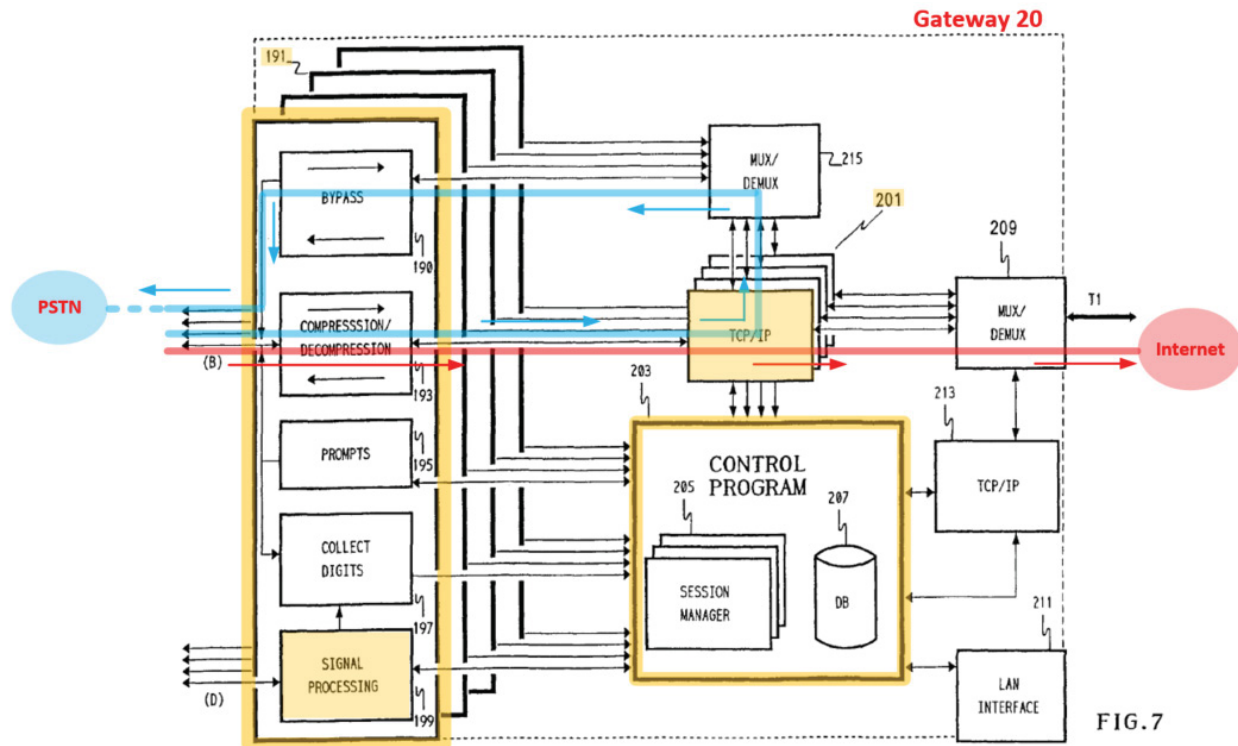
*packet loss rate*, and *data transfer rate*.” EX1004, 10:1-8, 10:47-59 (emphasis added). Farris further describes that “[i]f traffic conditions for communication with a particular remote location are unacceptable,” the MCU “signal[s] the PSTN network to set up one or more ISDN or T1 pipeline connections” for routing a call through the PSTN, instead of the Internet. *Id.*, 10:60-11:5; *see also* 5:16-37 (“Calls between two end location gateway servers of the data internetwork can be diverted, **during periods of unacceptable network conditions**, through the PSTN network”) (emphasis added). Accordingly, Farris discloses that the MCU in the gateway (corresponding to the server system) “checks whether the call can be routed via the packet network” according to a decision “based on whether the core packet network can be expected to provide packet transmission that meets the quality requirements of the network,” (e.g., monitoring “traffic conditions on the Internet” such as “response time, percentage utilization, packet forwarding rate, throughput, errors per second, packet loss rate, and data transfer rate” as described in Farris, at 10:47-59), and when “the server recognizes that the packet network connection is less economical than a PSTN connection, the result of this check would also be negative” (e.g., “Calls between two end location gateway servers of the data internetwork can be diverted, during periods of unacceptable network conditions, through the PSTN network” as described in Farris, at 5:16-37).

81. Base on my review of Farris and the '304 patent, therefore, Farris discloses at least the MCU for monitoring traffic conditions and setting up PSTN connections based on the monitored traffic condition, as the same as, or equivalent of, the server system for performing the algorithm described in the '304 patent. EX1001, 1:55-62, 4:1-10, 4:19-25, and Figure 2 (blocks 203 and 205).

***[7] The apparatus of claim 1, wherein said server system comprises a call feature server for controlling connections trough [sic] said packet switch in response to signals from said customer telephone stations.***

82. Farris discloses claim 7. As I described above with respect to element [1.6], Farris discloses that the gateway 20 (corresponding to the server system) “for controlling connections through said packet switch.” See ¶¶73-74.

83. As illustrated in FIG. 7 below, Farris discloses that the gateway includes the TCP/IP processing routine 201 (corresponding to, for example, the PAD 116 in FIG. 5) that, under direction of the control program 203 (corresponding to, for example, the MCU 108 in FIG. 5), “performs the two-way protocol processing to send and receive compressed, digitized voice data in TCP/IP packet format over the Internet.” EX1004, 12:40-48. Farris further describes that, if outgoing call data in TCP/IP packet format is to be routed through the PSTN, not the Internet, the packets are “directed under control program 203 to MUX/DEMUX 215 routine,” thereby being transmitted to “the appropriate PSTN destination.” *Id.*, 13:25-50.



Annotated FIG. 7 of Farris

84. Farris further discloses that the gateway includes “a number of *call processing function routines* 191 for processing incoming and outgoing calls.” EX1004, 11:54-55 (emphasis added), FIG. 7 (above). The call processing function routine 191 includes the signal processing routine 199, and the routine 199 provides “*incoming signals*” that “indicate a new incoming call on one of the associated B channels and identify the call as a data call or a voice call. The signals for such a call may include *the dialed number as well as a number associated with the origin of the call.*” *Id.*, 12:18-26 (emphasis added). Further, “[t]he session manager [205 of the control program 203] receives and processes various signals from the call processing function routines 191 and provides the necessary

instructions to the routines to execute each individual call processing function. The control program 203 also controls or administers TCP/IP addressing functions and initiates certain necessary signaling communications through the Internet.”

EX1004, 12:27-39.

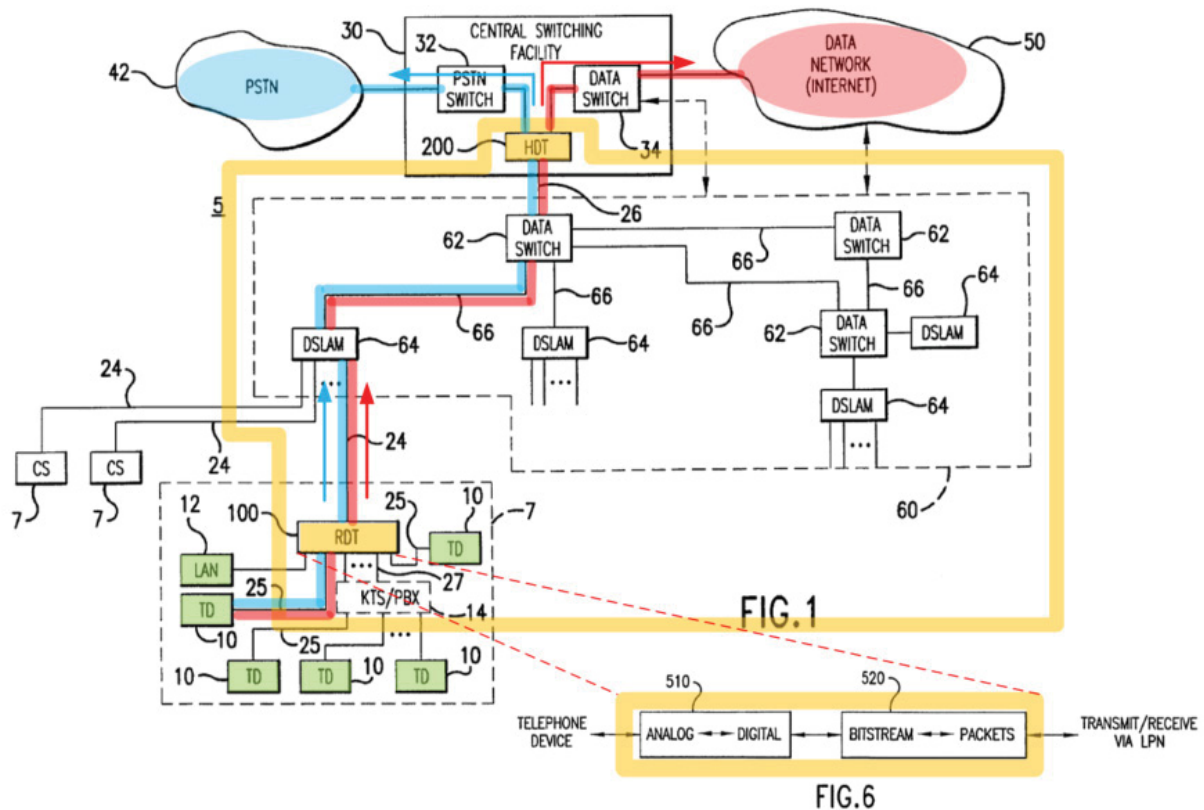
85. Therefore, based on my review of Farris and the '304 patent, Farris's server system (e.g., gateway) includes the call feature server (e.g., call processing function routines and/or control program) for controlling connections through the packet switch (e.g., TCP/IP processing routine or packet assembler/disassembler (PAD)) in response to signals from said customer telephone stations (e.g., incoming signals, dialed number, number associated with the origin of the call, etc.), as recited in element [7].

## **XI. ANALYSIS OF COMBINATION OF FRANKEL AND GUPTA**

***[1.P] In a telecommunications network, comprising a core packet network and a circuit public switched telephone network (PSTN), apparatus for establishing a telecommunications connection comprising:***

86. Frankel discloses each of the features of the preamble of claim 1. As illustrated in FIG. 1 below, Frankel describes a telecommunications network having the data network (the Internet) 50 and the PSTN 42. EX1005, 6:19-25. The data network (the Internet) has been known as an apparent example of a core packet network. For example, Frankel suggests that the data network (the Internet) is a packet network. EX1005, 6:23-25 (“The data switch 34 may route data packets

to and from a data network 50, such as the Internet.”). This is also evidenced by Farris. EX1004, 4:15 (“a data packet network, such as the Internet”). Further, a “core” network merely indicates a central portion of a network as opposed to an access network that connects to customers. As clearly illustrated and described in Frankel, the data network (the Internet) is a “core” packet network, not an access network connecting to customers.



Annotated FIGS. 1 and 6 of Frankel

87. Further, as shown in FIG. 1, Frankel discloses network components, such as a remote digital terminal (RDT) 100, a host digital terminal (HDT) 200, a local packet network (LPN) 60, and other associated elements, that are configured

for establishing telecommunications connection to the PSTN 42 and the Internet 50. EX1005, 5:25-6:45.

***[1.1] a packet access network connectable to a plurality of customer telephone stations; and***

88. Frankel discloses a packet access network connected to a multiple customer telephone stations, which is for example illustrated as a yellow box in FIG. 1 above. For example, Frankel's network includes the local packet network (LPN) 60 and the remote digital terminal (RDT) 100 that is connected to the LPN 60. EX1005, 5:37-57. Frankel describes that the RDT 100 is connected to "a plurality of telephone devices (TDs) 10." *Id.*, 5:27-29.

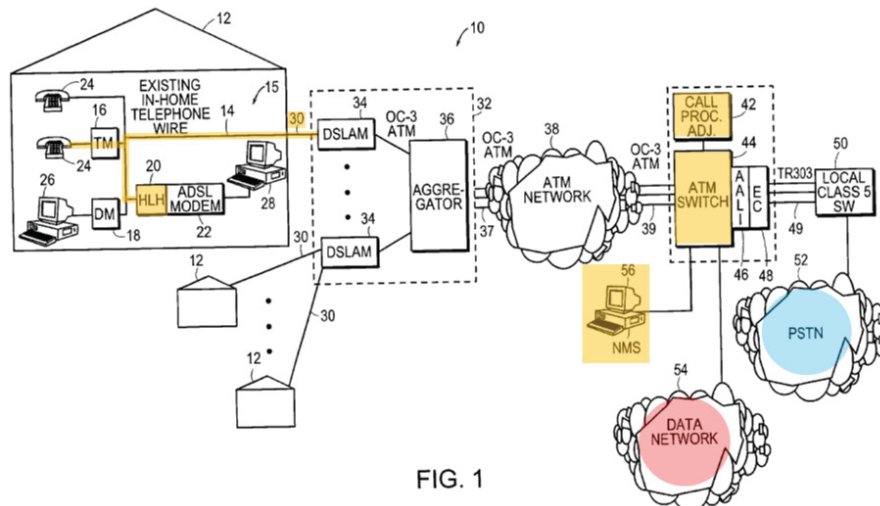
***[1.2] a server system;***

89. Based on my knowledge and experience in this field and my review of Frankel, Frankel discloses a central switching facility 30 as a server system. EX1005, 6:19-28. For example, Frankel describes that the central switching facility 30 remotely manages multiple customer sites 7 that each include the RDT 100 and multiple telephone devices (TDs) 10. *Id.*, 4:21-55, 6:18-32, FIG. 1 Further, the central switching facility is at least partially implemented in a computer system and. *Id.*, 8:10-11 ("In the preferred embodiment, the HDT 200 is implemented in a conventional computer system.").

90. Even if Frankel were considered as not being explicit as to a server system, it would have been obvious to a POSITA to implement at least part of the



central switching facility and/or other network components described in Frankel as a server system. This is clearly evidenced by Gupta. For example, Gupta teaches a server that controls a switch for accessing the PSTN and the data network. Gupta describes a communications network topology similar to Frankel, that is a communications network including the data network and the PSTN via the ATM network. *See e.g.*, EX1005, 4:21-30, FIG. 1; EX1006, 1:65-67, 2:33-41, 4:64-66, 5:3-5, 5:43-59, 6:9-45, 34:11-48, FIG. 1 (below). Further, Gupta discloses the call processing adjunct (CPA) 42 that controls the ATM switch 44 for accessing the PSTN and the data network. EX1006, 34:12-25, 35:25-38, FIG. 1. Notably, Gupta describes that the CPA is implemented in a server system, such as such as the “COBRA server 386”. *Id.*, 38:56-40:30 (“a management subsystem in the CPA is built around a CORBA (Common Object Request Broker Architecture) server at its core”), FIG. 28 (below).



Annotated FIG. 1 of Gupta

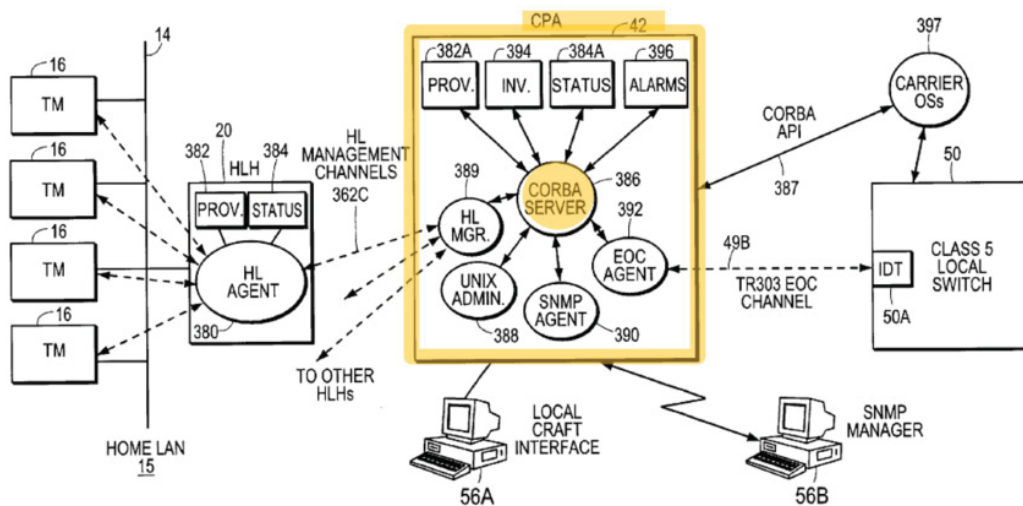


FIG. 28

Annotated FIG. 28 of Gupta

91. Based upon my knowledge and experience in this field and my analysis of Frankel and Gupta, it is clear that a POSITA would have achieved this predictable result with a reasonable expectation of success. In particular, a POSITA would have recognized that it would be obvious to implement Frankel based on Gupta's teaching of the CPA being implemented in a server system for controlling the ATM switch for accessing the PSTN and the data network, thereby providing at least part of Frankel's central switching facility (including the HDT 200) being implemented in a server system as taught by Gupta. As discussed below (elements [1.3] and [1.4]), Frankel's central switching facility including the HDT, as modified in view of Gupta, controls a packet switch (e.g., the packet conversion

processor 280 in the HDT 200) for accessing the PSTN and the Internet. *See* ¶¶94-97.

92. Based on my knowledge and experience in this field, several reasons would have motivated a POSITA to modify Frankel based on Gupta's suggestions, such as those benefits expressed in Gupta. EX1006, 38:33-65, 40:21-30. For example, the resulting system of Frankel and Gupta would (i) make it easy to "share management information from the network element across the different operations support systems (OSSs) that might already be in place in the PSTN," (ii) provide reliable and cost-efficient methods for network element management without relying on "an ordinary PC or UNIX-based, desktop workstation," (iii) make "all of the capabilities of the network element [] available through a CORBA interface," (iv) make it "easy to add new protocols as CORBA clients, such as the BellCORE TL1 protocol, if desired to inter-operate with OSSs," and (v) improve overall system reliability and availability by allowing other OSSs to communicate with the CPA directly if a particular element manager fails to work. *Id.*, 38:33-65, 40:21-30.

93. Based upon my knowledge and experience in this field and my analysis of Frankel and Gupta, it is clear that a POSITA would have achieved this predictable result with a reasonable expectation of success. Notably, Frankel and Gupta are in the same field of endeavor, that is the telecommunications network

including the PSTN and the packet data network. EX1005, 6:18-33, 4:21-30, 3:56-63; EX1006, 4:61-5:5, 6:9-45, 6:46-63, 1:59-67. Further, Frankel and Gupta use similar techniques, such as using local packet network (ATM network) to access the PSTN and the data network, in order to solve the same problems of effectively using the combined resources of the PSTN and the data network. *Id.* The predictable combination of Frankel and Gupta would have been achieved by simply incorporating switching control elements (e.g., the HDT 200) as disclosed in Frankel into a server system as taught by Gupta (e.g., the CPA being implemented as the CORBA server). EX1005, 6:18-25; EX1006, 38:56-40:30. A POSITA would have been naturally motivated to look to Gupta's server for known advantages including improved system reliability and availability of the voice and data communications network as suggested in Frankel.

***[1.3] said packet access network comprising an interface gateway and a packet switch;***

94. Frankel discloses the claimed packet access network of this element. In particular, Frankel describes the packet access network as discussed above (¶88 (element [1.1])), and the packet access network includes the RDT 100 and the HDT 200 that correspond to the interface gateway and the packet switch, respectively. See ¶¶97-102 (elements [1.4], [1.5]).

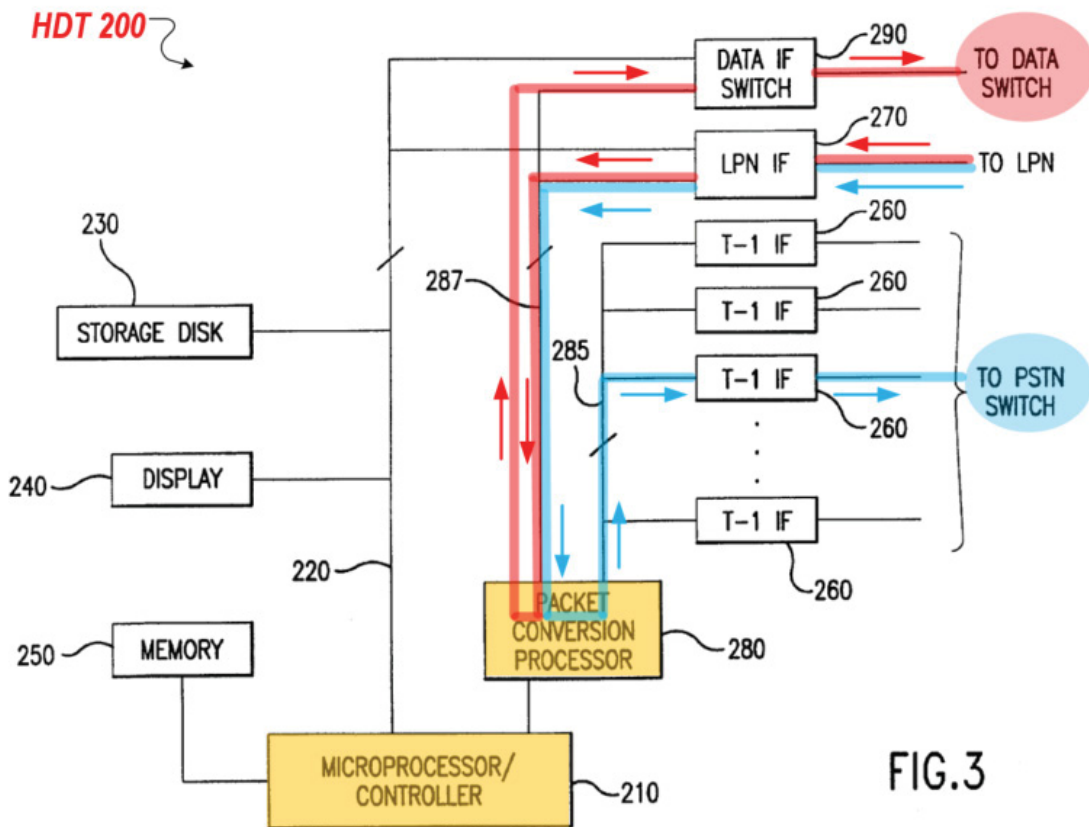
95. For example, the RDT 100 includes in Frankel's packet access network "interfaces a plurality of telephone devices (TDs) 10 and, optionally, a

local area network (LAN) 12 to a local loop link, such as a line supporting the Digital Subscriber Line (DSL) transport protocol.” EX1005, 5:27-32. Accordingly, the RDT 100 functions as the gateway interface as described in the ’304 patent. *See* ¶¶98-102 (element [1.5]).

96. Further, the HDT 200 included in Frankel’s packet access network is connected to the PSTN 43 through the PSTN switch 32 and connected to the Internet 50 through the data switch 34. EX1005, 6:18-25, FIG. 1. Frankel describes that the HDT at the central switching facility receives packets from the LPN and transmits the packets to the PSTN or the Internet via the PSTN switch and the data switch, respectively. *Id.*, 4:21-30. Accordingly, at least part of the HDT 200 functions as the packet switch as described in the ’304 patent. *See* ¶97 (element [1.4]).

***[1.4] said packet switch for accessing said PSTN and said core packet network;***

97. Frankel discloses the claimed packet switch of this element. For example, Frankel describes that the HDT 200 operates to access the PSTN and the Internet. EX1005, 4:21-30, 4:38-55, 6:18-45, 13:55-14:8, FIG. 1. In particular, as shown in FIG. 3 (below), Frankel’s HDT includes a packet conversion processor 280 that “converts packets received from LPN via the LPN IF 270” to a format suitable to be transmitted to either the PSTN via the PSTN switch or the Internet via the data switch. *Id.*, 8:42-58, FIG. 3.



Annotated FIG. 3 of Frankel

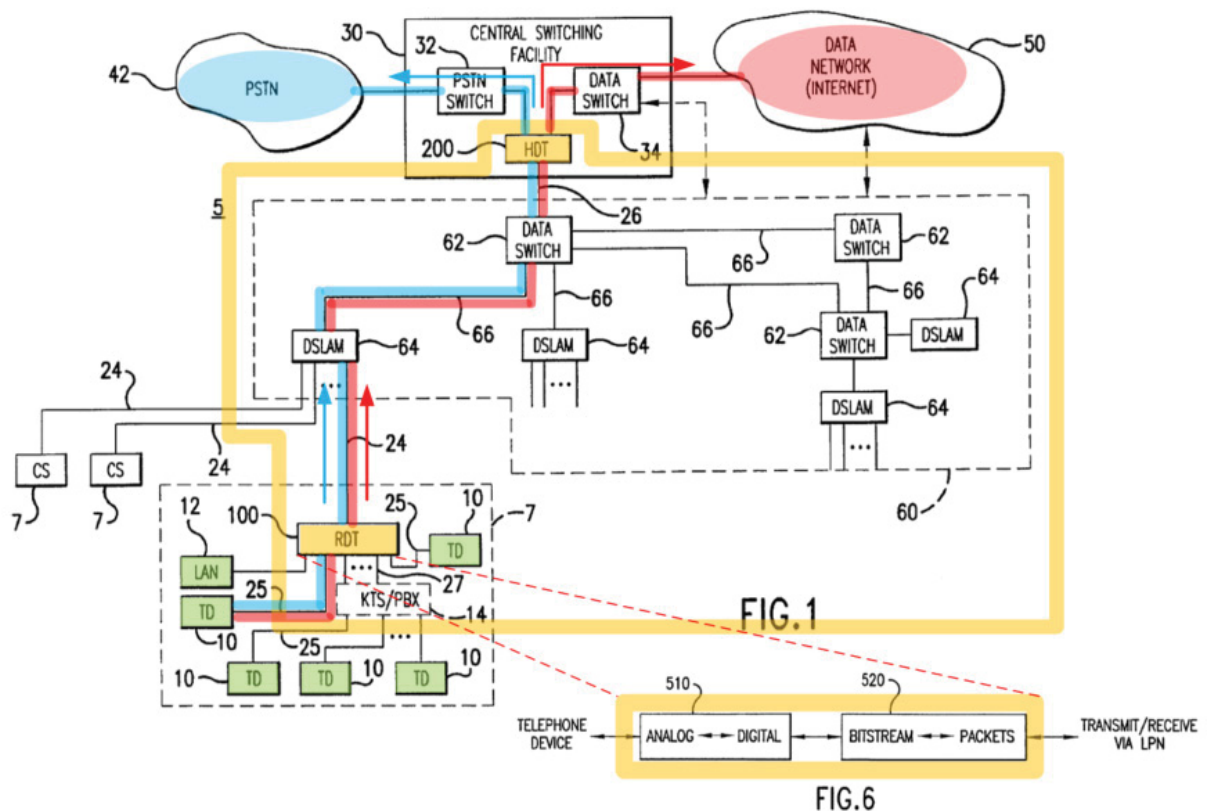
**[1.5] said interface gateway comprising circuits for converting signals from said plurality of customer telephone stations to packets for switching by said packet switch;**

98. Frankel discloses this claimed element of the interface gateway. For example, Frankel discloses that the RDT, or components included in the RDT, provides the “circuits for converting signals from said plurality of customer telephone stations to packets for switching by said packet switch.”

99. For example, Frankel discloses that the RDT 100 provides circuits that receive signals from multiple telephone devices (TDs) 10 and convert the signals to packets (e.g., “voice-band packets,” “call control packets,” and “data

packets”) that are suitable for communication via the LPN 60. EX1005, 5:56-6:8, 6:47-50 (“the RDT 100 is embodied as circuit board”), 3:64-4:10, 7:57-8:4 (“converting voice-band packets to and from conventional analog telephone signals”), 13:33-54, 9:22-59 (“The RDT 100 converts analog telephone signals to and from a suitable digital packet format in order to communicate with the attached analog TDs 10. In addition, if communication with data devices at the customer site is supported and required, the RDT 100 converts data packets from the data devices to and from a suitable packet format for communication via the LPN.”). Further, the converted packets are switched by the HDT 200. *Id.*, 9:22-59 (“Similarly, the HDT 200 converts voice-band information and data packets between different types of digital formats in order to conduct communications via the PSTN switch 32 and the data switch 34.”).

100. I note that the ’304 patent does not describe the structure of the claims “circuits” except that the “common data and access controller (COMDAC) 16” is described as converting signals from the customer telephone stations to packets. EX1001, 2:13-23. Again, Frankel discloses the above structures that clearly correspond to the COMDAC described in the ’304 patent. *See above* ¶¶99.



Annotated FIGS. 1 and 6 of Frankel

101. FIG. 2 (below) of Frankel further describes that the RDT includes the DSL modem 120, along with the controller 110, that “formats the modulated information into a suitable packet format, such as the asynchronous transfer mode (ATM) protocol for example, that is utilized by the equipment in the LPN 60 for the transport of information.” EX1005, 6:63-7:1, 7:36-38 (“The controller 110, under control of the software program stored in the ROM 140, performs two major functions: call set-up control and voice-band data conversion.”), 11:26-28 (“The bit stream-to-packet (and vice versa) conversion is performed by the controller 110.”), 11:42-59, FIG. 6.



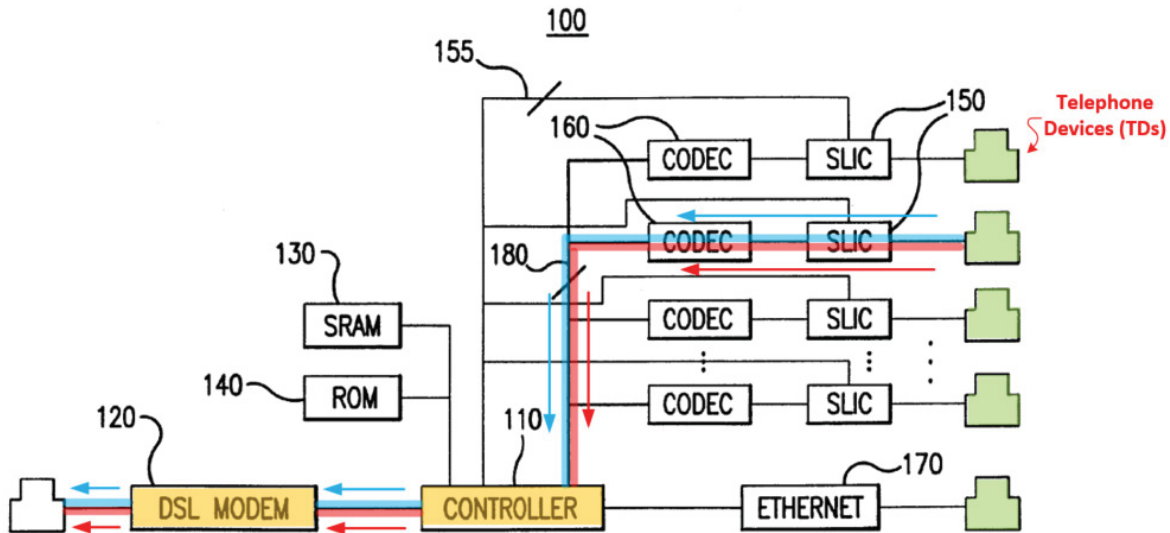


FIG.2

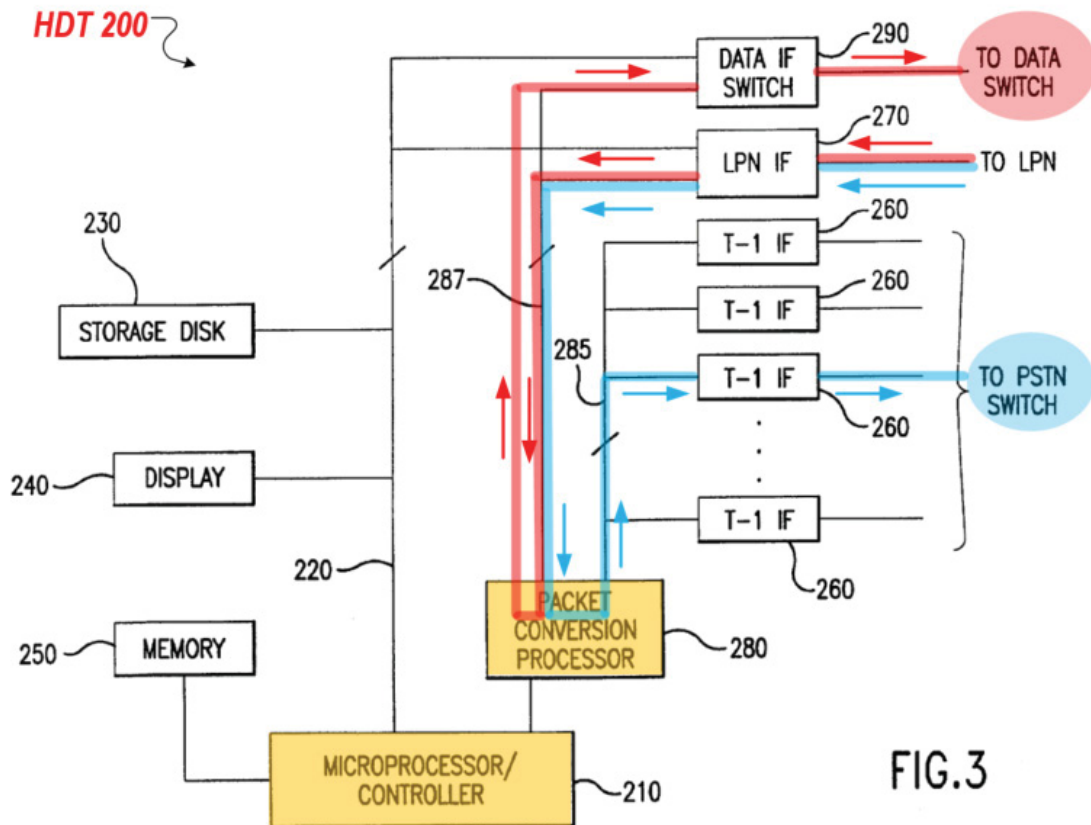
Annotated FIG. 2 of Frankel

102. In addition, Frankel discloses that the above structures convert the signals for the purposes of “switching by said packet switch.” In particular, Frankel discloses that the converted packets are eventually routed to, and switched by, the HDT (or at least part thereof) toward the PSTN or the Internet. EX1005, 8:42-58, 9:22-59, FIG. 3; see ¶97 (element [1.4]).

***[1.6] said saver [sic] system for controlling connections through said packet switch.***

103. Frankel, modified based on Gupta, discloses the claimed server system of this element. For example, as illustrated in FIG. 3 below, Frankel’s HDT includes the packet conversion processor 280 that receives packets from the LPN, convert the packets to suitable formats for the PSTN switch and the data switch,

and then switches the packets toward the Internet via the data switch and the PSTN via the PSTN switch. EX1005, 8:39-59, FIG. 3. Further, Frankel discloses that the microprocessor/controller 210 controls the packet conversion processor 280. *Id.*, 8:52-56 (“The packet conversion processor 280 is preferably implemented by an application-specific processor, and its operation is supervised by the microprocessor/controller 210 for call control functions, call setup, system errors and other matters.”).

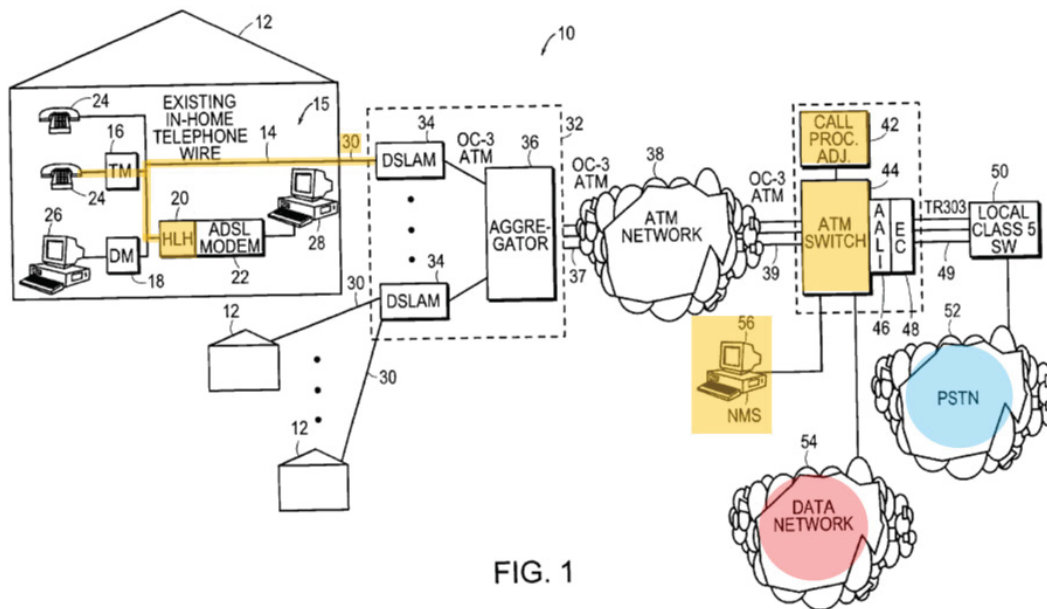


Annotated FIG. 3 of Frankel

104. Notably, Frankel discloses that the HDT resides at the central switching facility 30. EX1005, 6:18-32, FIG. 1. As discussed above (¶¶89-93 with

respect to element [1.2]), Frankel teaches that at least part of the central switching facility 30 is implemented in a server system. EX1005, 6:19-28. Therefore, Frankel provides a server system (e.g., central switching facility 30 that contains microprocessor/controller 210) for controlling connections to the PSTN and the Internet through the packet switch (e.g., packet conversion processor 280).

105. To the extent that Frankel is not explicit as to element [1.6], the predictable combination of Frankel in view of Gupta would have achieved this element and provided predictable benefits at the time. For example, Gupta describes a gateway (the virtual loop gateway 40) having the ATM switch 44 for switching AAL1 cells (i.e., packets) between the PSTN 52 and the data network 54. EX1006, 5:1-5, 5:43-59; 35:44-45 (“voice packets (e.g., AAL1, AAL2, AA5, IP)”), 43:19-44:13. Gupta also discloses the call processing adjunct (CPA) 42 that controls the ATM switch 44 for accessing the PSTN and the data network. EX1006, 34:12-25, 35:25-38, FIG. 1 (below). Moreover, Gupta’s CPA is implemented in a server system (including the “CORBA server 386”). EX1006, 38:56-40:30, FIG. 28; *see* ¶¶89-93 (element [1.2]).



Annotated FIG. 1 of Gupta

106. Similarly, Frankel teaches that the HDT functions as the packet switch for accessing the PSTN and the Internet. EX1005, 4:21-30, 4:38-55, 6:18-45, 8:42-58, 13:55-14:8; *see* analysis of element [1.4] above. Further, Frankel teaches that the HDT “may be incorporated into the ATM switch (the data switch 62) of the LPN 60. *Id.*, 6:35-37, 5:38-41. Therefore, a POSITA would have been readily recognized the Gupta’s teaching in the same technical field of Frankel, and would have been motivated to apply Gupta’s teaching of the server system in the Frankel’s HDT (or the ATM switch incorporating the HDT) such that Frankel’s HDT functionality (for switching to the PSTN and the Internet) is controlled by a server system as taught by Gupta.

107. As discussed above (element [1.2]), multiple reasons would have motivated a POSTIA to apply Gupta's teaching to Frankel to arrive at this predictable result with a reasonable expectation of success. *See* ¶¶89-93 (element [1.2]). Further, a number of additional reasons would have prompted a POSITA to modify Frankel based on Gupta's suggestion to thereby achieve known benefits.

108. As a first reason, a POSITA would have readily motivated to implement at least part of Frankel's HDT (corresponding to the packet switch) as a server system as taught by Gupta, to thereby achieve the known benefits of centralizing controls of switching systems and functionalities at a server system, thereby predictably achieving more computing power, speed, and efficiency than local solutions.

109. As a second reason, a POSITA would have been motivated implement Frankel's system in view of Gupta's suggested improvements in order to achieve the advantages (expressly articulated in Gupta) for Frankel's communications network. For example, Gupta provides "low-risk migration" strategy of the broadband networking platforms into the PSTN, thereby providing "data services with high efficiencies and fast service creation" while preventing a "significant discontinuity in the features, services, and overall quality that customers have come to expect from the well-established circuit-switched network." EX1006, 1:11-35, 1:59-67; *see also* EX1005, 3:45-53. It would have been obvious to a

POSITA that Frankel would have been readily improved by applying Gupta's suggested benefits to Frankel as they are related to similar technologies, such as providing voice and data services through the broadband network and the PSTN.

110. As a third reason, a POSTA would have recognized that implementing Frankel's system based on Gupta's suggested server system yields a predictable result from combining known prior art elements according to known benefits. For example, such as predictable result of the Frankel-Gupta combination would have provided a CORBA server or other known types of server system, as taught by Gupta, that controls connections through the HDT or the ATM switch as disclosed in Frankel. Moreover, a POSITA would have appreciated that the Frankel-Gupta combination would not change the hallmark aspects of either reference. For example, the resulting system would not change Frankel's HDT for accessing the PSTN via the PSTN switch and the Internet via the data switch. Similarly, Gupta's suggested features of a CORBA server for implementing the CPA that controls the ATM switch (corresponding to Frankel's HDT incorporated in the ATM switch) would have remained unchanged in the resulting system. Again, the respective teachings of Frankel and Gupta would work in combination just as they did apart, with Gupta's suggestions merely improving/adding to Frankel's system.

***[3] The apparatus of claim 1, wherein said server system comprises means for determining whether a call should be routed over said PSTN or said core packet network.***

111. Frankel discloses claim 3 under at least the first alternative construction of the “means for” term. As discussed above in Section IX, I note that, under this potential construction, the scope of this “means for” element includes the “call feature server” and any “equivalents thereof.” See ¶52.

112. Based on my review of the '304 patent and Frankel, Frankel discloses several elements that amount to the corresponding structure of the “call feature server” or “equivalents thereof.” For example, Frankel’s HDT includes “[t]he packet conversion processor 280” that “is preferably implemented by an application-specific processor, and its operation is supervised by the microprocessor/controller 210 for ***call control functions, call setup***, system errors and other matters.” EX1005, 8:52-56 (emphasis added). Frankel further discloses:

FIG. 5 illustrates the complementary call set-up procedure 400 in the HDT 200, again, in the case when a call is initiated by a telephone device connected to the RDT 100. The use of the ATM protocol is referred to in the following description as an example of a suitable networking technology used by the LPN. Reference is also made to FIG. 3 in connection with this description. In step 410, the HDT 200 receives the call control packet containing ***a control message*** from the RDT 100 ***indicating that a telephone device has gone off-hook***. In step 415, the HDT 200 identifies ***the source of the call control message*** by looking at the address provided in the ATM

cell containing the call control packet request. It is verified whether the request is valid, i.e., *coming from a customer site 7 whose account is active*. In step 420, the HDT 200 notifies the PSTN switch 32 via the designated control channel over one of the T-1-IFs 260 of the request. In reply, the PSTN switch 32 assigns an available time-slot for the call on one of the T-1 facilities, and this time-slot information is received by the HDT 200 in step 425, together with a dial-tone over that time-slot. Next, in step 430, the HDT 200 assigns a call reference value for the call and communicates that value in a control message that is transmitted to the RDT 100. Finally, in step 435, the HDT 200 generates voice-band packet(s) representing a dial-tone for the call and transmits it to the RDT 100.

Calls that are initiated by devices on the HDT side of the system are received by the HDT 200 when the PSTN switch 32 detects a match between a *received telephone number* and a table of telephone numbers assigned to a customer site within the supervisory control of the HDT 200. In response, the HDT 200 transmits to the RDT 100 a call control packet containing a command for a ringing signal that is interpreted by the RDT 100 to generate an analog ringing signal for connection to the appropriate TD 10. A call reference value is assigned, and voice-band packets are exchanged between the HDT 200 and RDT 100 in a manner analogous to that described for a call initiated at the RDT 100. When the addressed telephony device at the RDT 100 goes off-hook, the RDT 100 generates a control packet indicating same, and the HDT 200, upon receipt of that packet, notifies the PSTN switch 32 that the call has been answered. Thereafter, the operation of the RDT 100 and HDT 200 continues as



explained below. The communication of a data packet to a data device at the customer site is initiated in an analogous manner when the data switch 34 receives a data packet destined for a data device at the customer site.

It should be understood that the "telephone numbers" associated with the TDs 10 connected to the RDT 100 are managed by the PSTN switch 32 located in the central switching facility 30. When a person somewhere in the PSTN 42 *dials a number*, such as 404-555-1234, traditional PSTN technology *routes that call* to the PSTN switch 32, which in turn presents *the call information*, as described herein, to the HDT 200, for transmission to the RDT 100 and ultimately to the connected TD 10. Thus, the TDs 10 connected to the RDT 100 operate identically to telephone devices connected directly to the central switching facility 30, and can make and receive PSTN telephone calls in the traditional fashion.

*Id.*, 10:18-11:9 (emphasis added). As such, Frankel discloses that “when a call is initiated by a telephone device connected to the RDT,” the HDT “receives the call control packet containing *a control message* from the RDT 100 *indicating that a telephone device has gone off-hook*,” and “identifies *the source of the call control message* by looking at the address provided in the ATM cell containing the call control packet request.” *Id.*, 10:18-30. Moreover, Frankel describes the HDT as verifying that the call control packet request comes from *a customer site having an active account*, and notifying the PSTN switch 32 *for routing a call* over the PSTN. *Id.*, 10:30-63. Moreover, Frankel teaches “the ‘*telephone numbers*’

associated with the TDs 10 connected to the RDT 100 are managed by the PSTN switch 32 located in the central switching facility 30.” *Id.*, 10:64-11:5 (emphasis added).

113. As discussed above (elements [1.2] and [1.6]), the predictable Frankel-Gupta combination provides the HDT or part of the central switching facility implemented as a server system. *See* ¶¶89-93, 103-110.

114. Based on my review of Frankel, Gupta, and the ’304 patent, a POSITA would have recognized that the server system in the predictable Frankel-Gupta combination (corresponding to, for example, the HDT or central switching facility) includes the “call feature server” or “equivalents thereof”—including, for example, the packet conversion processor and microprocessor/controller for call control functions, call setup, system errors and other matters, and/or PSTN switch associated with the HDT, for analyzing customer dialed information (corresponding to, for example, “identif[ying] the source of the call control message by looking at the address provided in the ATM cell,” managing “the ‘telephone numbers’ associated with the TDs,” presenting “call information”) and combining it with customer data (corresponding to, for example, “verif[ying] that the call control packet request comes from a customer site having an active account”), in order to determine the routing of a call. EX1005, 10:18-42, 10:64-11:5; EX1001, 2:35-41, 3:16-27.

***[7] The apparatus of claim 1, wherein said server system comprises a call feature server for controlling connections through [sic] said packet switch in response to signals from said customer telephone stations.***

115. The predictable Frankel-Gupta combination discloses this element of claim 7, and indeed both Frankel and Gupta demonstrate the conventional nature of this element. As I described above (element [1.6]), Frankel alone and in view of Gupta teaches the HDT (corresponding to the server system) “for controlling connections through said packet switch.” See ¶¶103-110. Further, Frankel’s HDT includes “[t]he **packet conversion processor 280**” that “is preferably implemented by an application-specific processor, and its operation is supervised by the **microprocessor/controller 210 for call control functions**, call setup, system errors and other matters.” EX1005, 8:52-56 (emphasis added).

116. Frankel also teaches that “when a call is initiated by one of the TDs 10 connected to the RDT 100,” “an SLIC 150 [in the RDT 100] detects that a connected TD 10 is off-hook, and a **corresponding signal** is coupled to the controller 110,” and the controller 110 “generates a **control message** (formatted into a call control packet) indicating the off-hook status and requesting a dial-tone, that is **transmitted to the HDT 200** via the LPN 60.” EX1005, 9:60-7:2 (emphasis added). Moreover, Frankel describes that the HDT 200 “receives the call control packet containing a **control message** from the RDT 100 indicating that **a telephone device has gone off-hook**,” and “identifies **the source of the call control message**

by looking at the address provided in the ATM cell containing the call control packet request.” *Id.*, 10:18-30 (emphasis added). The HDT also verifies that the call control packet request comes from “a customer site 7 whose account is active,” and “notifies the PSTN switch 32” for routing a call over the PSTN. *Id.*, 10:30-63.

117. Similarly to Frankel, Gupta provides the recited features of the “call feature server” of claim 7. In particular, Gupta describes that “a call agent 514, similar to the CPA 42 (FIG. 1)” provide “the conventional custom calling features such as call waiting and three-way calling.” EX1006, 43:47-63. As discussed above (elements [1.2] and [1.6]), multiple reasons would have motivated to combine the teachings of Frankel and Gupta to achieve the known benefits. *See* ¶¶89-93, 103-110.

118. As discussed above (elements [1.2] and [1.6]), the predictable Frankel-Gupta combination provides the HDT or part of the central switching facility implemented as a server system. *See* ¶¶89-93, 103-110.

119. Therefore, based on my review of Frankel, Gupta, and the ’304 patent, a POSITA would have recognized that the server system in the predictable Frankel-Gupta combination (corresponding to, for example, the HDT or central switching facility as shown in Frankel-Gupta combination) includes the claimed “call feature server” (corresponding to, for example, the packet conversion processor and the microprocessor/controller for “call control functions, call setup,

system errors and other matters,” and/or the PSTN switch associated with the HDT as shown in Frankel-Gupta combination) for controlling connections through the packet switch in response to signals from customer telephone stations (corresponding to, for example, “corresponding signal,” “control message,” “call control message,” etc. as shown in Frankel-Gupta combination), as required in element [7].

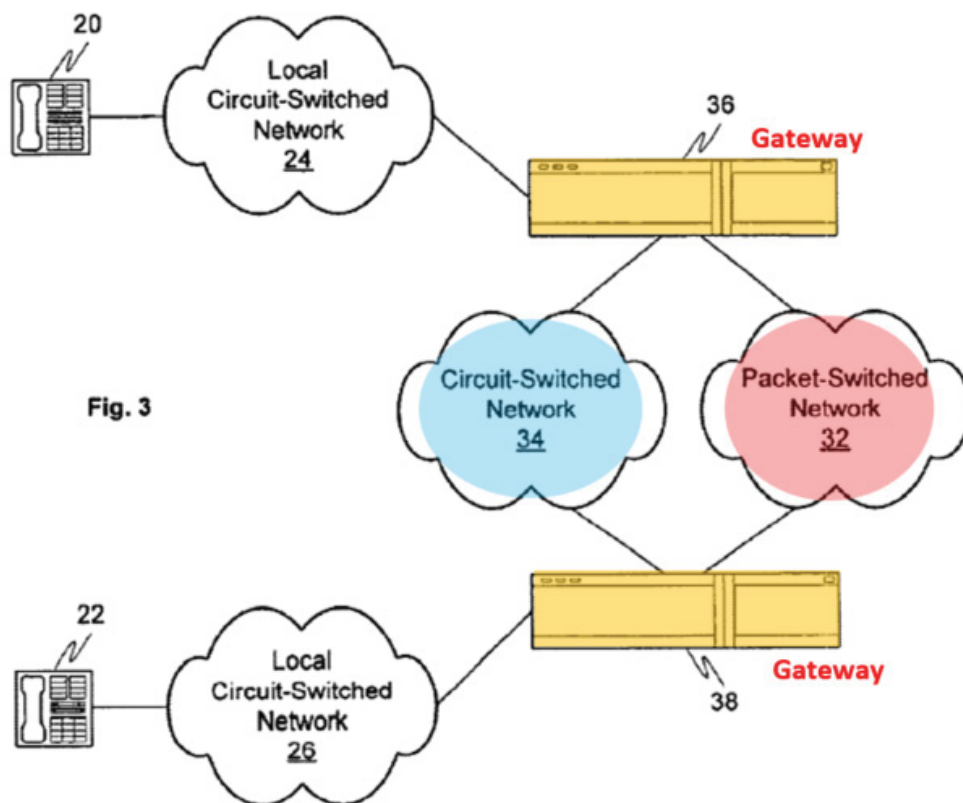
## **XII. ANALYSIS OF COMBINATION OF FRANKEL, GUPTA, AND ARMISTEAD**

***[3] The apparatus of claim 1, wherein said server system comprises means for determining whether a call should be routed over said PSTN or said core packet network.***

120. Frankel, modified in view of Gupta and Armistead, discloses claim 3 under at least the second alternative construction of the “means for” term. As discussed above in Section IX, I note that, under this construction, the scope of this “means for” element in dependent claim 3 includes the “server system” that performs the network algorithm of “check[ing] whether the call can be routed via the packet network” according to a decision “based on whether the core packet network can be expected to provide packet transmission that meets the quality requirements of the network,” and when “the server recognizes that the packet network connection is less economical than a PSTN connection, the result of this check would also be negative,” and equivalents thereof. *See* ¶53.

121. Based on my review, the predictable combination of Frankel in view of Gupta and Armistead teaches the corresponding structure of such a server system performing the network algorithm or “equivalents thereof.” For example, Frankel discloses the HDT in the central switching facility (corresponding to the server system, as discussed above) “continuously monitor the amount of bandwidth of the local loop link used by a given RDT 100 at customer site for voice traffic.” EX1005, 13:3-19. Frankel also discusses delay problems in packet networks and provides schemes “to avoid the delays (latency) inherent in some packet networks.” *Id.*, 13:27-32.

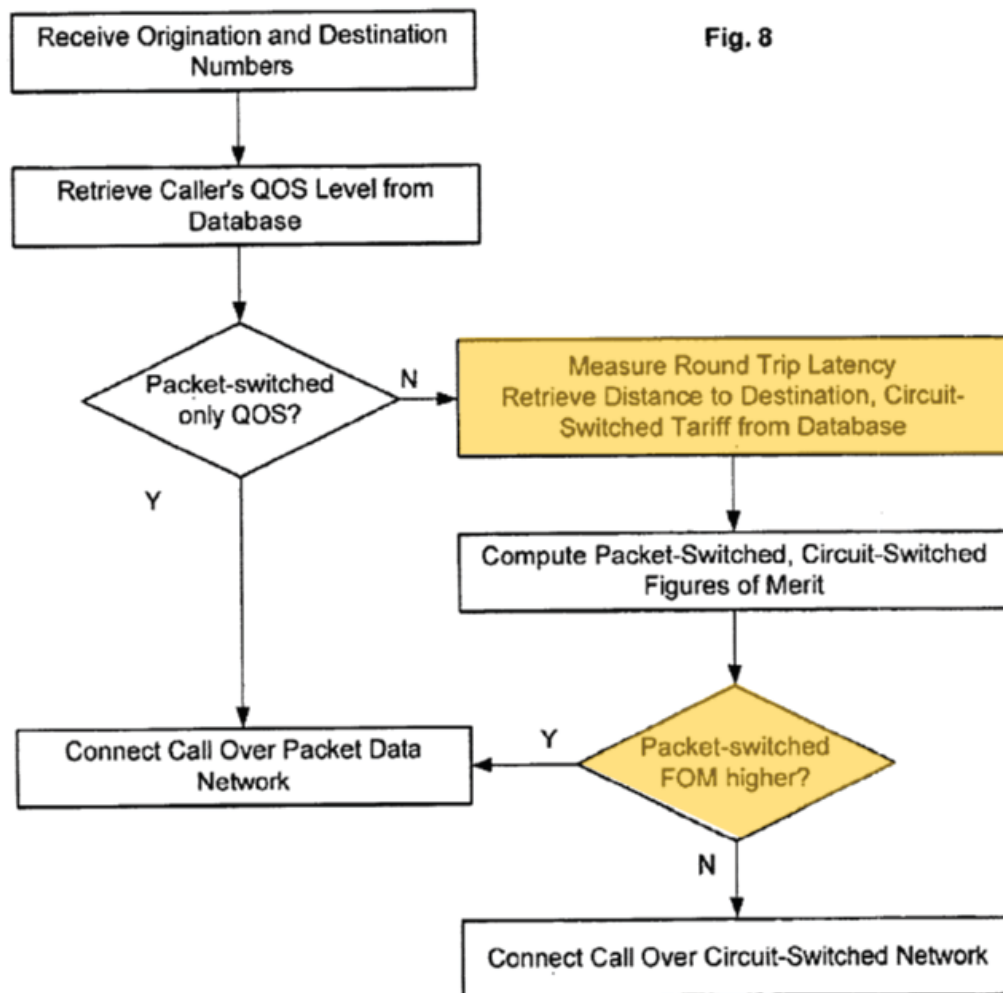
122. I note that Armistead relates to similar technologies to Frankel and Gupta, such as accessing the PSTN and the packet network using ATM protocol. EX1005, 4:24-30, 9:21-59; EX1006, 1:65-67, 2:33-41, 4:64-66, 5:3-5, 5:43-59, 6:9-45, 34:11-48; EX1008, 3:14-47, 1:53-61. As illustrated in FIG. 3 (below), Armistead further discloses a packet voice gateway 36 that is connected to a packet-switched network 32 and a circuit-switched network 34, thereby defining two different paths for telephone calls. EX1008, 3:14-47. Further, Armistead describes that a typical gateway includes “a packet data transceiver 58 [that] communicates with a packet-switched network, e.g., using IP (Internet Protocol) or ATM (Asynchronous Transfer Mode) packets.” EX1008, 1:53-61.



Annotated FIG. 3 of Armistead

123. Armistead discusses several disadvantages of packet delay in packet-switched networks. EX1008, 1:27-41 (“As traffic increases, packets may be delayed, increasing the latency of the connection.”). In this regard, as shown in FIG. 8 (below), Armistead describes that the gateway “determines which network path is most desirable” by monitoring “[r]ound trip latency” or “examin[ing] a time-filtered estimate of latency.” *Id.*, 7:4-41, FIG. 8 (below), 7:41-44 (***If the packet-switched FOM drops below the circuit-switched FOM for the call***, the initiating gateway attempts a parallel connection to the remote gateway over the

circuit-switched network”) (emphasis added), 5:24-36 (“a ‘figure of merit’ (FOM) for each possible network path”).



Annotated FIG. 8 of Armistead

124. Based on my knowledge and experience in this field and my review of Frankel, Gupta, and Armistead, a POSITA would have been readily recognized the Armistead’s suggestions are in the same technical field of Frankel and Gupta (e.g., accessing the PSTN and the packet network using ATM protocol). For reasons articulated below, a POSITA would have been motivated to apply Armistead’s



suggestion for the gateway that measures latency (packet delay) in the resulting network of the Frankel-Gupta combination (described above the analysis of claim 1; employing the ATM protocol and including, for example, the central switching facility or the HDT therein) for accessing the PSTN and the Internet. Moreover, a POSITA would have recognized that Frankel-Gupta's ATM protocol-based network for accessing the PSTN and the Internet, as modified in view of Armistead's suggestions of monitoring latency at the gateway, would be the same as, or equivalent of, the algorithm described in the '304 patent. EX1001, 1:55-62, 4:1-10, 4:19-25, and Figure 2 (blocks 203 and 205).

125. Based on my knowledge and experience in this field, a number of reasons would have motivated a POSITA to modify Frankel-Gupta according to Armistead's suggestion to thereby achieve known benefits.

126. As a first reason, a POSITA would have been prompted to apply Armistead's teaching of examining packet delay (latency) in order to provide a uniform quality of service during a call based on selective establishment of the circuit-switched connection and the packet-switched connection. EX1008, 2:1-14.

127. As a second reason, a POSTA would have recognized that implementing Frankel-Gupta's system to incorporate Armistead's suggested technique of monitoring packet delay (latency) yields a predictable result from combining known prior art elements according to known benefits. Such a

predictable result of the Frankel-Gupta-Armistead combination would have included Frankel-Gupta's central switching facility or the HDT therein, capable of determining latency to determine whether packet voice-band packets should be routed over the PSTN or the Internet, as taught by Armistead.

128. Moreover, a POSTIA would have appreciated that the Frankel-Gupta-Armistead combination would not change the principle functionality of the primary system. For example, the resulting Frankel-Gupta-Armistead system would not change Frankel-Gupta's ATM-based network (including the central switching facility with the HDT). Similarly, Armistead's suggested features of monitoring packet delay through the packet-switched network would have remained unchanged in the Frankel-Gupta-Armistead resulting system. Again, the respective teachings would work in combination just as they did apart, with Armistead's suggestions merely improving/adding to Frankel-Gupta's system.

### **XIII. ANALYSIS OF GUPTA**

***[1.P] In a telecommunications network, comprising a core packet network and a circuit public switched telephone network (PSTN), apparatus for establishing a telecommunications connection comprising:***

129. Gupta discloses each of the features of the preamble of claim 1. For example, Gupta discloses a telecommunications network ("virtual loop carrier system 10") that includes the PSTN 52 and the data network 54. EX1006, 4:63-5:5. I note that the data network 54 is a core packet network. *Id.*, 6:48-53 ("The

HLH 20, as shown in FIG. 1, provides a gateway function for communication between devices on the home LAN 15 and the wide area network (WAN) that includes the access gateway 32, ATM network 38, the virtual loop gateway 40, the LDS 50 and other networks including the PSTN 52 and data networks 54.”), 5:3-5 (“a virtual loop gateway (VLG) 40 which connects the voice and data between the ATM network 38 and a local digital switch (LDS) 50 [connected to the PSTN 52] or data network 54.”), 6:9-45 (describing the HLH manages voice and data differently by converting PCM voice signals to ATM cells while converting data signals to Ethernet frames), FIG. 1. Further, a “core” network merely indicates a central portion of a network as opposed to an access network that connects to customers. As clearly illustrated and described in Gupta, the data network is a “core” packet network, not an access network connecting to customers.

130. Gupta further provides “a migration strategy that uses the broadband network” “while continuing to leverage the PSTN’s switching and service control engines” “by using a gateway between the broadband network and the PSTN.” EX1006, 1:59-67.

***[1.1] a packet access network connectable to a plurality of customer telephone stations; and***

131. As illustrated in FIG. 1 below, Gupta discloses a network (in the yellow box) that is connected to a plurality of telephones 24. In particular, Gupta’s network includes “telephone modules (TMs) 16” that each “convert[] analog voice

signals from a connected telephone 24 to digital signals in the form of pulse code modulation (PCM) samples.” EX1006, 5:6-14.

132. I note that Gupta’s network is a packet access network at least because the network includes “a home LAN hub (HLH) 20” that “converts the PCM samples along with channel associated signaling (CAS) into an ATM cell format optimized for transport voice” or alternatively into “Internet Protocol (IP) packets.” EX1006, 5:14-22, 5:25-31. I also noted that voice packets can be ATM cells and IP packets, as also evidenced in Gupta. *Id.*, 2:23-26.

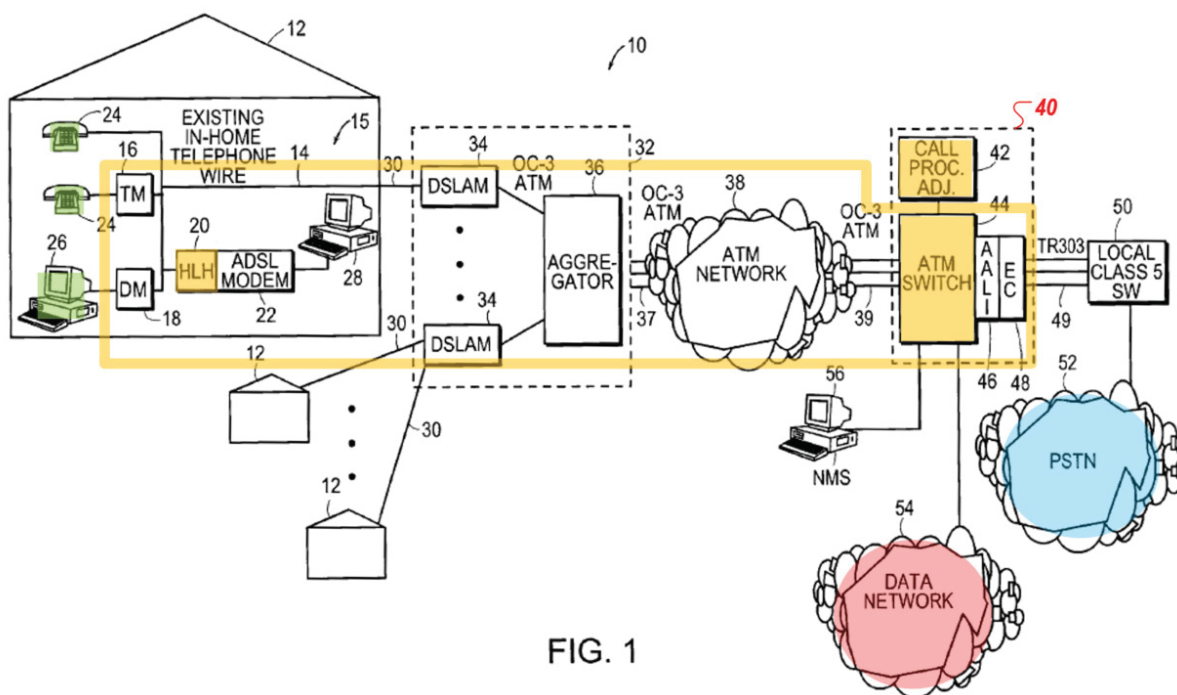


FIG. 1

Annotated FIG. 1 of Gupta

**[1.2] a server system;**

133. Gupta plainly discloses a server system that controls a switch for accessing the PSTN and the packet data network. For example, Gupta discloses the

call processing adjunct (CPA) 42 for controlling the ATM switch 44 for accessing the PSTN 52 and the data network 54. EX1006, 34:12-25, 35:25-38, FIG. 1.

Indeed, Gupta describes that the CPA is implemented in a server system, such as the COBRA server 386. *Id.*, 38:56-40:30, FIG. 28 (below).

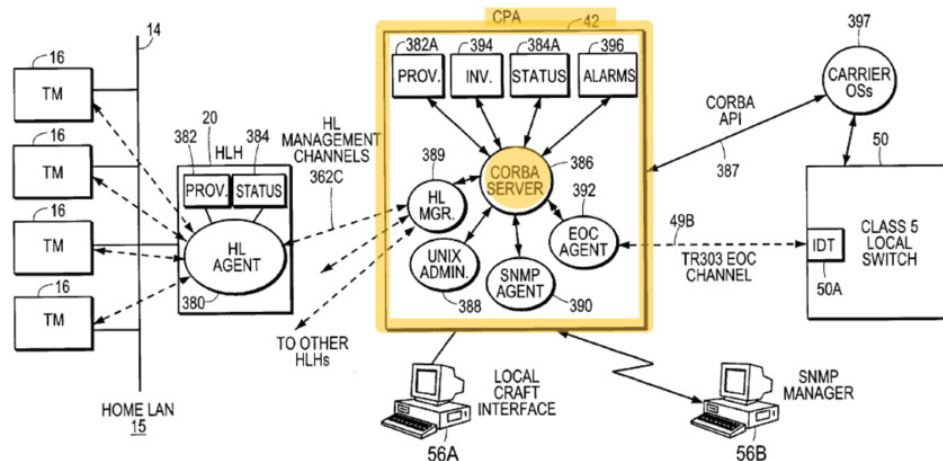


FIG. 28

Annotated FIG. 28 of Gupta

**[1.3] said packet access network comprising an interface gateway and a packet switch;**

134. Gupta discloses the claimed packet access network of this element. In particular, Gupta describes that the packet access network (in the yellow box in FIG. 1 above) includes the HLH 20 and the ATM switch 44 that correspond to the interface gateway and the packet switch, respectively.

135. For example, Gupta describes that the HLH provides an interface gateway function. EX1006, 6:48-53 (“The HLH 20, as shown in FIG. 1, provides a gateway function.”); see ¶¶139-143 (element [1.5]). Further, Gupta discloses a

telephone module (TM) 16 that “converts analog voice signals from a connected telephone 24 to digital signals in the form of pulse code modulation (PCM) samples.” EX1006, 5:6-11. Gupta further describes that “[t]he HLH 20 converts the PCM samples along with channel associated signaling (CAS) into an ATM cell format optimized for transport of voice” or alternatively into “Internet Protocol (IP) packets.” EX1006, 5:14-22, 5:25-31. I note that ATM cells and IP packets are examples of packets, as also recognized in Gupta. *Id.*, 2:23-26, 5:16-22 (“The embodiment described herein uses an ATM cell format known as ATM Adaptation Layer 1 (AAL1).”), 35:44-45 (“voice packets (e.g., AAL1, AAL2, AA5, IP)”).

136. Gupta further discloses that the packets that are converted from the signals of telephones are transmitted to the ATM switch 44 (corresponding to the packet switch) that operates to route the packets to the PSTN and the data network. EX1006, 5:42-59, 34:11-48, 1:11-35, 1:59-67, 2:4-7, 2:33-41, 4:64-66, 5:3-5, 6:9-45, FIG. 1; *see* ¶¶137-138 (element [1.4]).

***[1.4] said packet switch for accessing said PSTN and said core packet network;***

137. Gupta discloses the claimed packet switch of this element. For example, as depicted in FIG. 1 below, Gupta’s ATM switch 44 is configured for accessing the PSTN 52 (via the local digital switch (LDS)) and the data network 54. EX1006, 5:1-5, 5:42-59, 34:11-48, 6:9-45, FIG. 1.

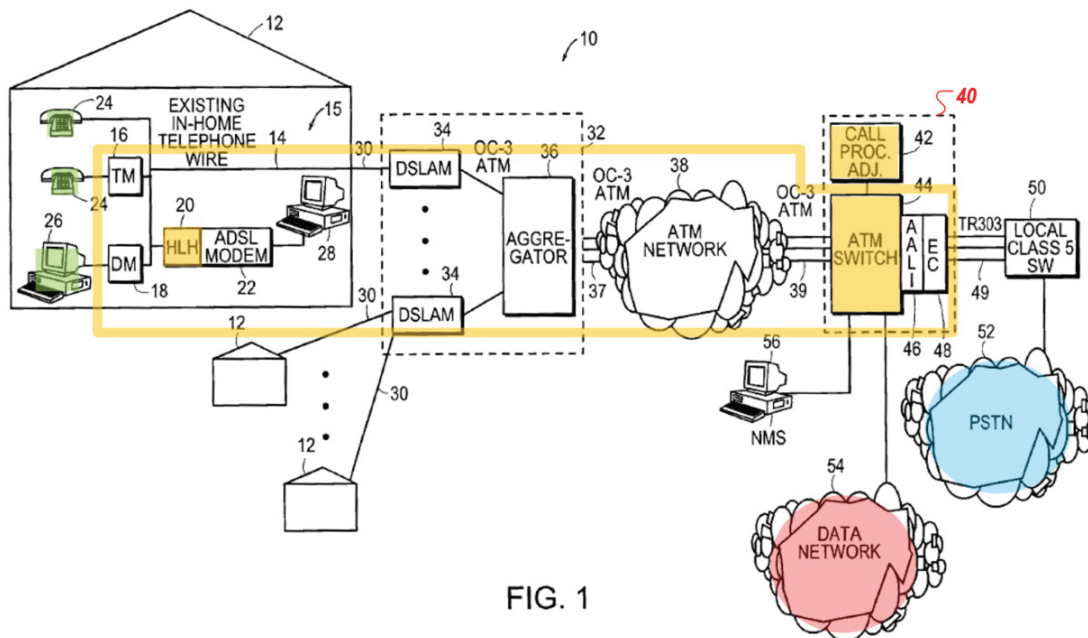


FIG. 1

Annotated FIG. 1 of Gupta

138. Further, Gupta describes that the ATM switch 44 is a *packet* switch at least because the ATM switch routes packets (e.g., ATM packets, IP packets, etc.) toward the PSTN 52 and the data network 54. EX1006, 5:49-50 (“In particular, the AAL1 cells are routed through ATM switch 44.”), 2:23-25 (“The voice packets can be any packet format such as ATM cells (e.g., ATM Adaptation Layer versions AAL1, AAL2, AAL5) or IP packets.”).

**[1.5] said interface gateway comprising circuits for converting signals from said plurality of customer telephone stations to packets for switching by said packet switch;**

139. Gupta discloses this claimed element of the interface gateway. For example, Gupta discloses that the HLH, or components included in the HLH,

provides the “circuits for converting signals from said plurality of customer telephone stations to packets for switching by said packet switch.”

140. I note that the '304 patent does not describe the structure of the claims “circuits” except that the “common data and access controller (COMDAC) 16” is described as converting signals from the customer telephone stations to packets. EX1001, 2:13-23.

141. Gupta discloses components that clearly correspond to the COMDAC described in the '304 patent. In particular, Gupta describes that “telephone modules (TMs) 16” “converts analog voice signals from a connected telephone 24 to digital signals in the form of pulse code modulation (PCM) samples.” EX1006, 5:6-14. Gupta also discloses that the HLH 20 “converts the PCM samples along with channel associated signaling (CAS) into an ATM cell format optimized for transport voice” or alternatively into “Internet Protocol (IP) packets.” *Id.*, 5:14-22, 5:25-31. Again I note that ATM cells and IP packets are examples of packets, as also evidenced in Gupta. *Id.*, 2:23-26.

142. Indeed, FIG. 3A of Gupta describes that the HLH provides circuits that “includes an analog front end (AFE) 70 which connects to the home wiring 14 (FIG. 1) on line 71 for transmitting and receiving voice signals according to the home LAN physical (PHY) layer.” EX1006, 6:56-60. Gupta also discloses that the HLH includes “a multi-service chip (MSC) device 64 which includes an ATM



adaptation layer circuit 64A that is configured to convert the PCM samples to AAL1 cells and the signaling to AAL5 cells.” *Id.*, 6:9-21, 6:64-7:13.

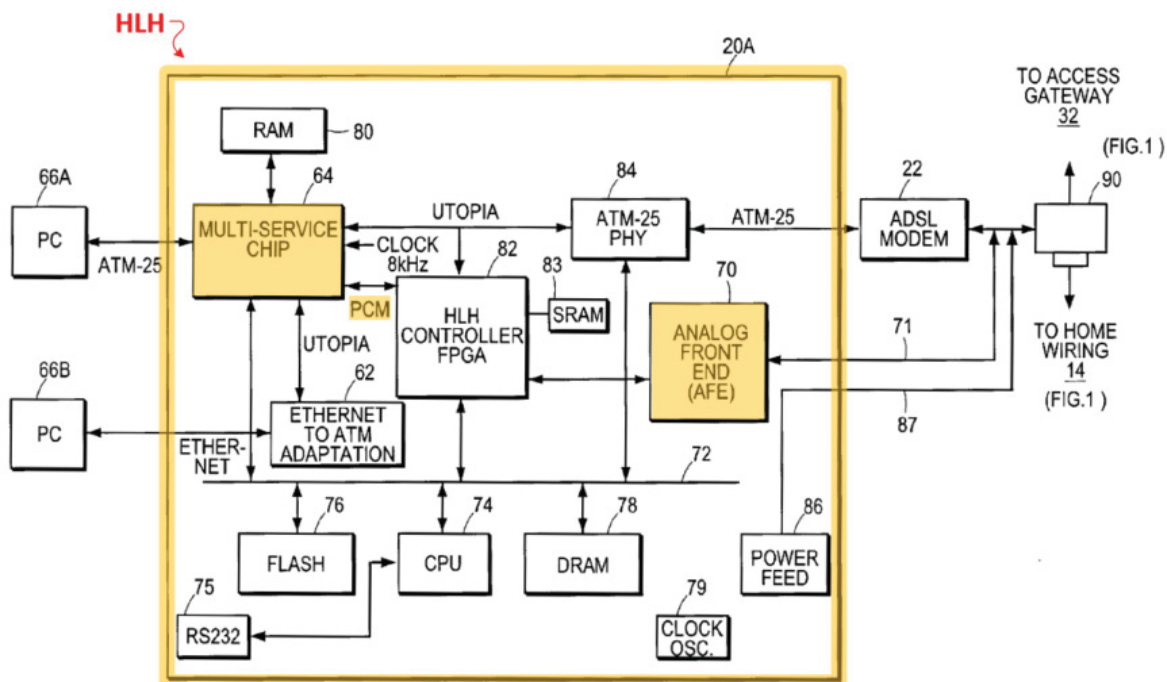


FIG. 3A

Annotated FIG. 3A of Gupta

143. Based on my review of Gupta and the '304 patent, therefore, Gupta discloses that the HLH (corresponding to the gateway interface) includes the MSC and/or the AFE (corresponding to the circuits) for converting signals from the plurality of telephones to packets for switching by the ATM switch (corresponding to the packet switch). *See also* EX1006, cl. 1 (“the hub further including a **packet converter circuit** converting between the voice signals and voice packets”) (emphasis added).

[1.6] said saver [sic] system for controlling connections through said packet switch.

144. Gupta plainly discloses the server system of this element. Again, Gupta describes the virtual loop gateway 40 that includes the ATM switch 44 for switching ATM cells or IP packets (“voice packets”) between the PSTN 52 and the data network 54. EX1006, 5:1-5, 5:43-59; 35:44-45. Gupta further describes that the call processing adjunct (CPA) 42 controls the ATM switch 44 for accessing the PSTN and the data network. *Id.*, 34:12-25, 35:25-38, FIG. 1. Moreover, as shown in FIG. 28 below, Gupta discloses that the CPA is implemented in a server system, such as the COBRA server 386. EX1006, 38:56-40:30; *see* ¶133 (element [1.2]), ¶¶89-93, 103-110 (elements [1.2] and [1.6] in Section XI).

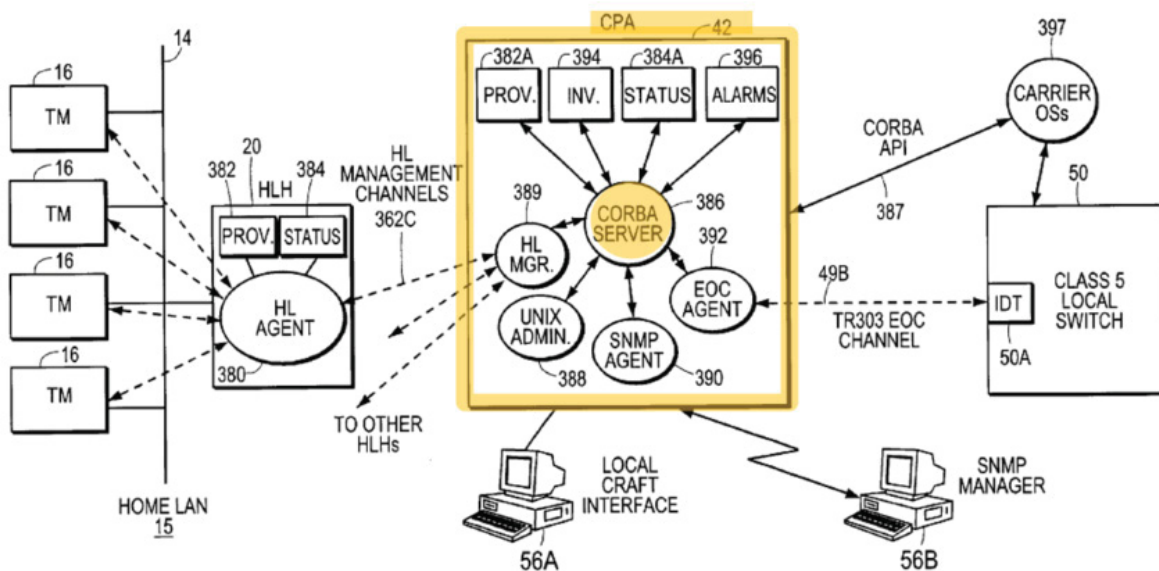


FIG. 28

Annotated FIG. 28 of Gupta

***[3] The apparatus of claim 1, wherein said server system comprises means for determining whether a call should be routed over said PSTN or said core packet network.***

145. Gupta discloses claim 3 under at least the first alternative construction of the “means for” term. As discussed above in Section IX, I note that, under this potential construction, the scope of this “means for” element includes the “call feature server” and any “equivalents thereof.” See ¶52.

146. Based on my review of the '304 patent and Gupta, Gupta discloses several elements that amount to the corresponding structure of the “call feature server” or “equivalents thereof.” For example, the CPA (corresponding to the server system) converts particular ATM cells to call processing messages to provide “well-known services and custom calling features at subscribers at home.” EX1006, 5:52-58. As shown in FIG. 24 below, Gupta further identifies that the CPA is “the focal point for supporting end-to-end call control functions,” and includes “call processing task 364” and “switch controller task 366” that interact with each other. *Id.*, 35:25-26, 34:21-25, 35:33-34. Further, Gupta discloses that the CPA stores in memory tables such as “call reference value (CRV) table 370” that is “used to associate an incoming or outgoing call to a TM on an HLH.” *Id.*, 34:26-31. I note an alternative embodiment of Gupta where the “call agent 514, similar to the CPA 42 (FIG. 1)” provides “the conventional custom calling features such as call waiting and three-way calling.” *Id.*, 43:60-63.

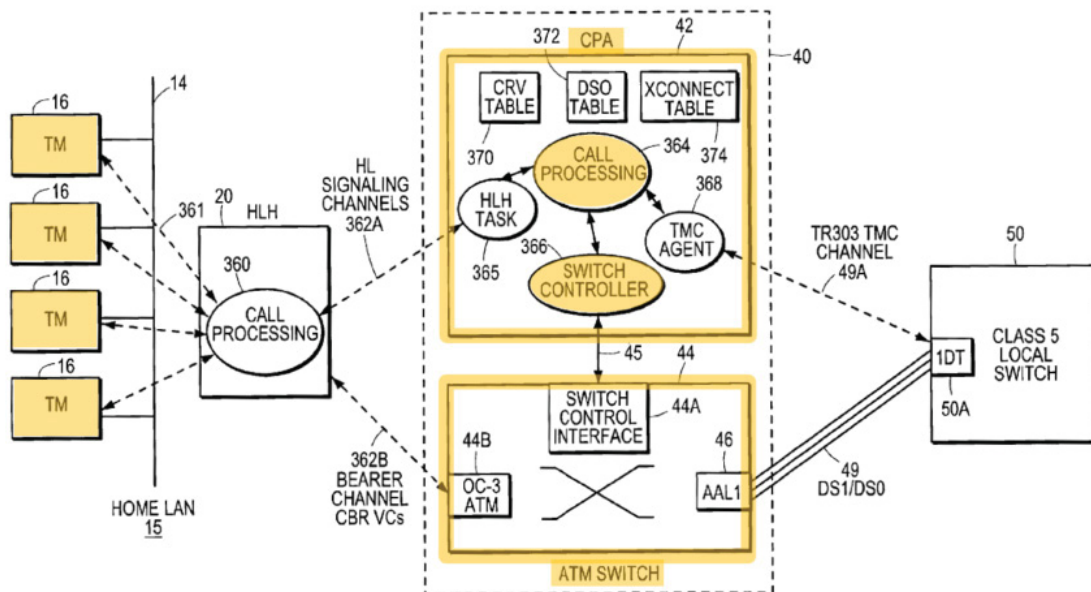


FIG. 24

Annotated FIG. 24 of Gupta

147. Based on my review of Gupta and the '304 patent, Gupta's server system (corresponding to, for example, the CPA) includes the "call feature server" or "equivalents thereof"—including, for example, the call processing task, the switch controller task, the call agent, and/or other elements of the CPA, for analyzing customer dialed information (corresponding to, for example, "incoming or outgoing call") and combining it with customer data (corresponding to, for example, "call reference value (CRV) table 370"), in order to determine the routing of a call (corresponding to, for example, "well-known services and custom calling features" or "the conventional custom calling features such as call waiting and three-way calling."). EX1006, 5:52-58, 35:25-26, 34:21-34, 43:60-63; EX1001, 2:35-41, 3:16-27.

***[7] The apparatus of claim 1, wherein said server system comprises a call feature server for controlling connections through [sic] said packet switch in response to signals from said customer telephone stations.***

148. Gupta discloses claim 7. In particular, Gupta describes that the CPA (corresponding to the server system) converts particular ATM cells to call processing messages to provide “well-known services and custom calling features at subscribers at home. EX1006, 5:52-58. As shown in FIG. 24 below, Gupta further identifies that the CPA is “the focal point for supporting end-to-end call control functions,” and includes “call processing task 364” and “switch controller task 366” that interact with each other. *Id.*, 35:25-26, 34:21-25, 35:33-34. Further, Gupta discloses that the CPA stores in memory tables such as “call reference value (CRV) table 370” that is “used to associate an incoming or outgoing call to a TM on an HLH.” *Id.*, 34:26-31. I note an alternative embodiment of Gupta where the “call agent 514, similar to the CPA 42 (FIG. 1)” provide “the conventional custom calling features such as call waiting and three-way calling.” *Id.*, 43:60-63.

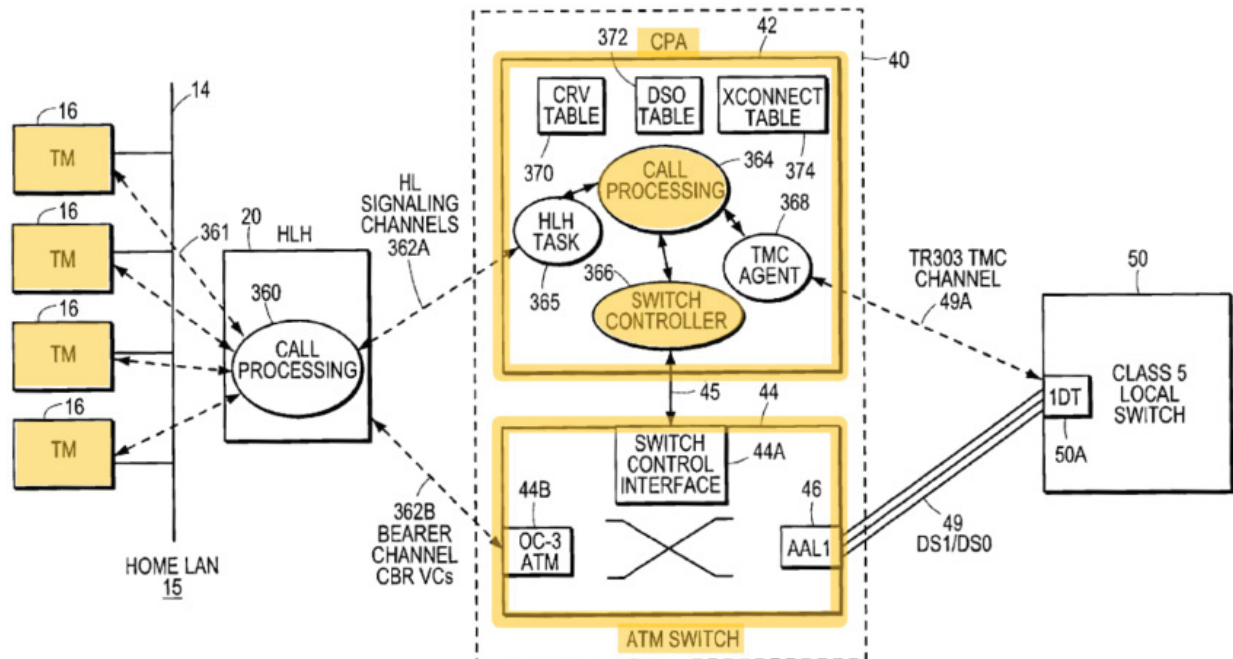


FIG. 24

Annotated FIG. 24 of Gupta

149. Based on my knowledge and experience in this field and my review of Gupta, Gupta discloses that the CPA (corresponding to the server system) includes the call processing task and/or the call agent (corresponding to the call feature server) for controlling connections through the switch controller task (corresponding to the packet switch) in response to signals from customer telephone stations (e.g., signals representative of incoming or outgoing calls from TMs).

#### XIV. ANALYSIS OF COMBINATION OF GUPTA AND MURPHY

***[3] The apparatus of claim 1, wherein said server system comprises means for determining whether a call should be routed over said PSTN or said core packet network.***

150. The teachings of Gupta in view of Murphy provide the element claim 3 under at least the second alternative construction. As discussed above in Section IX, I note that, under this construction, the “means for” element in dependent claim 3 includes the “server system” that performs the network algorithm of “check[ing] whether the call can be routed via the packet network” according to a decision “based on whether the core packet network can be expected to provide packet transmission that meets the quality requirements of the network,” and when “the server recognizes that the packet network connection is less economical than a PSTN connection, the result of this check would also be negative,” and equivalents thereof. *See* ¶53.

151. Notably, Gupta generally discusses delay or congestion problems in networks and provides, for example, the “network clock synchronization algorithm” to address such problems. EX1006, 9:28-39 (“In a real network, any clock synchronization algorithm on the receiver has to contend with cell delay variation (CDV), clock drift and cell impairments caused by delays or congestion through the network.”), 9:39-42 (“A network clock synchronization algorithm and implementation that is robust in the face of CDV, clock drift and cell impairments is now described.”); *see also* 9:43-13:20; 13:21-41 (“ATM cells in a real network

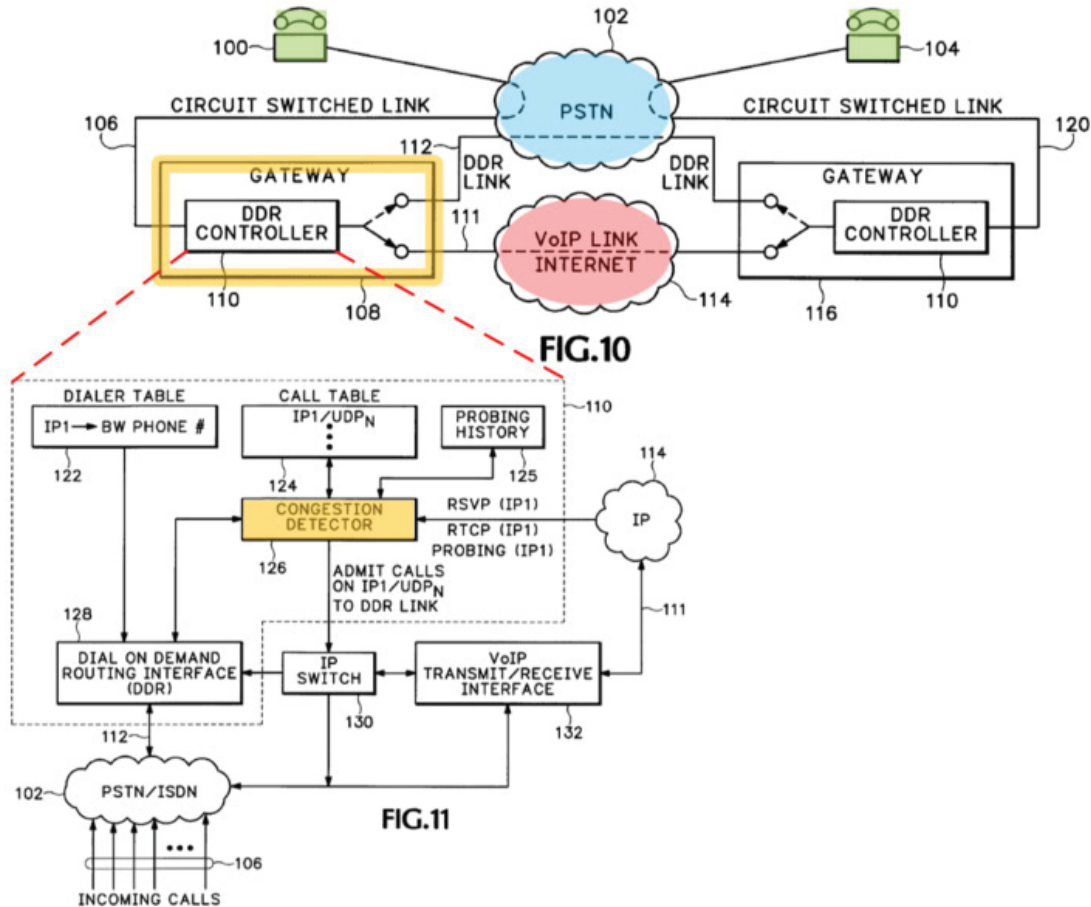


are subject to several kinds of impairments such as cell delay greater than the maximum CDV calculated above, cells being dropped and cells becoming corrupted.”).

152. I note that Murphy relates to similar technologies to Gupta, such as accessing the PSTN and the packet network using ATM protocol. EX1007, 2:60-3:6, 11:49-51; EX1006, 1:65-67, 2:33-41, 4:64-66, 5:3-5, 5:43-59, 6:9-45, 34:11-48. As shown in FIG. 10 below, Murphy discloses a gateway 108 that selectively routes a call over the PSTN and the Internet. EX1007, 7:55-8:43. Additionally, Murphy’s gateway employs a Dial on Demand Routing DDR scheme and includes a DDR controller 110 configured to establish a channel over the PSTN, instead of the Internet, based on detected congestion. *Id.*, 8:4-23. Specifically, as depicted in FIGS. 10 and 11 below, Murphy’s gateway 108 includes a congestion detector 126 that “detects IP network congestion” and “determine[s] if there is excessive packet delay.” *Id.*, 8:23-8:43. Murphy further describes that calls are routed between the PSTN and the Internet, depending on congestion associated with the addresses to which the calls are directed. *Id.*, 8:44-9:15. I note that Murphy’ DDR scheme “can be extended to any circuit switch technology, not just the PSTN, for example, Frame Relay or *ATM*.” *Id.*, 11:49-51 (emphasis added). Further, Murphy describes that “[w]hen a low quality of service condition is detected on the VoIP link with the destination endpoint, a fallback call is established with the destination



endpoint over a circuit switched network.” *Id.*, 1:54-2:16 (emphasis added), cls. 12, 19, 27.



Annotated FIGS. 10 and 11 of Murphy

153. Based on my knowledge and experience in this field and my review of Gupta and Armistead, a POSITA would have been readily recognized the Murphy’s suggestions are in the same technical field of Gupta, that is accessing the PSTN and the packet network using ATM protocol. Further, a POSITA would have been motivated to apply Murphy’s teaching of the congestion detector for detecting packet delay, in Gupta’s gateway (corresponding to, for example, the

virtual loop gateway 40 including the ATM switch) for accessing the PSTN and the data network. In addition, a POSITA would have recognized that Gupta's ATM protocol-based network for accessing the PSTN and the data network, as modified in view of Murphy's teaching of the congestion detector, would be the same as, or equivalent of, the algorithm described in the '304 patent. EX1001, 1:55-62, 4:1-10, 4:19-25, and Figure 2 (blocks 203 and 205).

154. Based on my knowledge and experience in this field, several reasons would have motivated a POSITA to modify Gupta according to Murphy's suggestion to thereby achieve known benefits.

155. As a first reason, a POSITA would have been prompted to apply Murphy's suggestion for monitoring packet delay to Gupta's system in order to provide a high quality of voice services "in the face of CDV [cell delay variation], clock drift and cell impairments" using the PSTN and the data network. EX1006, 9:28-42; EX1007, 2:2-16, 3:18-22, 3:34-42.

156. As a second reason, a POSTA would have recognized that implementing Gupta's system to incorporate Murphy's suggested technique of monitoring packet delay yields a predictable result from combining known prior art elements according to known benefits. Such a predicable result of the Gupta-Murphy combination would have included the known prior art elements of Gupta's gateway 40 including the ATM switch 44, capable of monitoring packet delay to

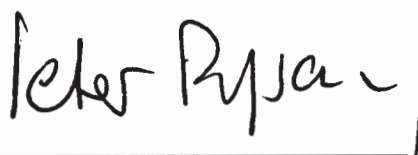
address problems caused by delays or congestions through the network and accordingly route packets through the PSTN and the data network, as taught by Murphy.

157. Moreover, a POSITA would have appreciated that the Gupta-Murphy combination would not change the principle aspects and primary operations of Gupta's system. For example, the resulting Gupta-Murphy system would not change Gupta's ATM-based network (including the virtual loop gateway 40 including the ATM switch 44). Similarly, Murphy's suggested features of monitoring packet delay through the Internet would have remained unchanged in the Gupta-Murphy resulting system. Again, the respective teachings would work in combination just as they did apart, with Murphy's suggestions merely improving/adding to Gupta's system.

## **XV. CONCLUSION**

158. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both (under Section 1001 of Title 18 of the United States Code).

Date: May 25, 2021

  
\_\_\_\_\_  
Peter Rysavy

# Appendix A

# Peter Rysavy – Curriculum Vitae

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+1-541-386-7475, [public.temp1@rysavy.com](mailto:public.temp1@rysavy.com), <http://www.rysavy.com>

**Peter Rysavy is an expert in wireless technology,  
mobile computing, and data networking**

## Contents

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## 1. Education:

BSEE, MSEE Electrical Engineering, Stanford University, 1979.

## 2. Work Experience

### **Rysavy Research. 1993 to Present: President**

Peter Rysavy is president of Rysavy Research LLC, a consulting firm that has specialized in wireless technology and mobile computing since 1993. Projects have included evaluation of wireless technology capabilities, network performance measurement, reports on the evolution of wireless technology, spectrum analysis for broadband services, strategic consultations, system design, articles, courses and webcasts, and test reports.

Peter Rysavy has expertise in IEEE 802.11 (Wi-Fi), wireless hotspots, mesh networks, metro and municipal Wi-Fi, paging technology, 2G, 3G, 4G, 5G, IMT-Advanced, IMT-2020, Global System for Mobile Communications (GSM), General Packet Radio Service (GPRS), Enhanced Data Rates for GSM Evolution (EDGE), Universal Mobile Telecommunications System (UMTS), Code Division Multiple Access (CDMA), Wideband CDMA (WCDMA), High Speed Downlink Packet Access (HSDPA), High Speed Uplink Packet Access (HSUPA), High Speed Packet Access (HSPA), HSPA+, Long Term Evolution (LTE), LTE-Advanced, LTE-Advanced Pro, LTE-Licensed Assisted Access (LAA), LTE-U, CDMA2000, CDMA2000 1XRTT, Evolved Data Optimized (EV-DO), Bluetooth, WiMAX, IEEE 802.16 (IEEE 802.16e, IEEE 802.16m), wireless security, smartphones, smartphone operating systems, Mobile IP, Evolved Packet System (EPS), Evolved Packet Core (EPC), e-mail, wireless e-mail, browsers, mobile browsers, media gateways, orthogonal frequency division multiplexing (OFDM), orthogonal frequency division multiple access (OFDMA), voice over IP (VoIP), mobile video, wireless spectrum, spectrum sharing, spectral efficiency, capacity analysis, mobile computing architectures, and TCP/IP networking.



## **Patent Litigation**

Peter Rysavy has worked in numerous cases, both as testifying and consulting expert. He has trial experience, reports, and depositions. See section 4 for details.

## **Analysis**

Rysavy Research analyzes wireless technologies for capability, compatibility, interoperability, and intellectual-property considerations.

## **Training**

Rysavy Research conducts wireless-technology training, both publicly and privately.

## **Testing and Reports**

Rysavy Research tests, evaluates, and reports on all major wireless technologies.

## **Application Development and Deployment**

Rysavy Research works with companies to define architectures, select vendors, perform pilots, and to deploy wireless systems and applications.

## **Clients (excluding confidential litigation cases) from 1993 to present include:**

5G Americas, AltaVista, Anchorage Partners, Antenna Software, Apple, Arris, AT&T, AT&T Wireless, Aventail, Black Lowe & Graham, Bluetooth SIG, Broadbeam, Cingular Wireless, City of Seattle, CMP Media, Compression Laboratories, Coinstar, Comverse Network Systems, Cricket Wireless, Crosslink Capital, Customer Focused Strategies, Datacomm Research, CTIA – The Wireless Association, Data Communications Magazine, Datacomm Research, Delco Electronics, Epicenter, Epicron, Ericsson, Fish and Richardson, Fluke, Foley Lardner, GE, Gerson Lehrman Group, Gibson Dunn, Good, Google, GSMA, Hillman Company, Hobnob, Hughes Network Systems, IMS Expert Services, Informa, Information Week, Intel, IT World, iWindsurf, Juniper Networks, Kirkland & Ellis, Klarquist Sparkman, MCCI, Medtronic Physio-Control, Microsoft, Mobile Computing Promotion Consortium (MCPC), Mobile Future, Moffatt Thomas, NetMotion Wireless, Network Magazine, Network Computing Magazine, New York State Wireless Association, Nokia, Norcom Networks, Novatel Wireless, OmniSky, Pacific Commware, Portable Computer and Communications Association (PCCA), Portland State University, Powell and Gilbert, Research in Motion (RIM), Park and Associates, Quality in Motion, RKM Holdings, Rogers Communications, Ruckus Wireless, Sanyo, SkyGo, Sprint, Stratos Product Development Group, Superconductor Technologies, Symbian, T-Mobile, TCI, Teklicon, Tektronix, Teledyne Electronic Technologies, Traveling Software (LapLink), United Business Media, University of British Columbia, UCLA, US Department of Defense, Wells Fargo, White & Case, Whitworth Analytics, WiMAX Forum, Wireless Data Forum, Wireless Technology Association, WRQ, Xerox Palo Alto Research Center, and Xircom.

**Wireless Technology Association. 2000 to 2016: Executive Director.**

Managed all the logistics of a non-profit industry organization that that evaluated wireless technologies, investigated mobile communications architectures, and promoted wireless-data interoperability. Organized and moderated more than fifty industry workshops.

**Traveling Software (LapLink), Bothell, WA, USA. 1992 to 1993: Vice President of Technology.**

Researched and evaluated key technologies. Developed Traveling Software's wireless communications strategy for local area and wide area connections. Helped define overall product and technology directions. Prototyped new technologies. Collaborated with technology partners. Developed license agreements for sale and purchase of technology. Participated in strategic sales efforts. Frequently traveled around the US and Asia. Spoke at conferences. Attended and monitored standards efforts. Managed patent applications and patent issues.

**Traveling Software (LapLink), Bothell, WA, USA. 1988 to 1992: Vice President, Research and Development.**

Developed Traveling Software's Research and Development department. Recruited over thirty professionals, including managers, design engineers, quality assurance engineers and technical writers. Under my management, we implemented: documented design and quality assurance procedures; a version control system; complete archiving with off-site storage; regular performance appraisals; a bonus plan; and well defined career paths. This R&D organization successfully brought in house all strategic technology and also released numerous successful software products for the retail PC market, including LapLink, LapLink Mac, DOS Connect for the HP 95LX, Organizer Link for the Sharp Wizard, and PC Link for the Casio BOSS.

**Fluke Corporation, Everett, WA, USA. 1979 to 1981 and 1983 to 1988: Program Manager, Project Manager, Design Engineer.**

As program manager, managed marketing group to determine target markets, sales channels, positioning and promotion in support of Fluke's operator interface business. As project manager, managed development of an entire family of communications-oriented touch terminals. Fluke introduced the first member, the 1020 Touch Control Screen in May, 1986. Directed software (C code for 68000 family processor), digital hardware (surface mount, semi-custom IC's, computer aided engineering), package design (injection molded plastic parts, steel chassis), and manuals (in English, French, German and Japanese.) Coordinated many groups: design, manufacturing, purchasing, component engineering, and marketing. As design engineer from 1979 to 1981, designed hardware and firmware for various systems, including: RS-232 communications; IEEE-488 communications; RS-485 multi-drop communications; thermal printer interface; cartridge drive interface; vacuum display driver and keypad driver.

**Other Work Experience:**

Time Office Computers, Australia, 1981 to 1983: Ethernet networking, random-access memory, power supply hardware development.



Stanford University, USA, 1976-1979: software consulting services for university/industry collaborations.

**Additional information:**

Available at <http://www.rysavy.com>

### 3. Patents

Peter Rysavy is the co-inventor of US4929935A, Apparatus for aligning raster scanned image to touch panel, filed May 2, 1986.

Peter Rysavy is the co-inventor of US4941845 A, Data transfer cable, filed June 7, 1989.

## 4. Testifying and Consulting Experience in Litigation

### Summary

Thirty-two cases as a testifying expert.

Court testimony as testifying expert in one patent-litigation trial.

Eight patent-litigation depositions.

One breach-of-contract litigation deposition.

Training in testifying. (Seak: *How to be an Effective Expert Witness.*)

Twenty-three expert declarations for Inter Partes Review (twelve patents).

Five expert reports on non-infringement (eleven patents).

Six expert reports on invalidity (nine patents).

Two expert reports on non-breach-of-contract.

Multiple additional cases as consulting expert.

### Ongoing Patent-Litigation Cases (most recent on top)

Testifying expert on patent invalidity for Motorola. Details available upon request.

Testifying expert for Microsoft. Inter Partes Review. U.S. Patent No. 6,664,891. *Case no. IPR2019-01188.* Firm: Klarquist Sparkman. Declaration filed June 11, 2019. Second declaration filed May 25, 2020. Patent Trial and Appeal Board ruled challenged claims unpatentable, November 4, 2020.

Testifying expert for Microsoft. Inter Partes Review. U.S. Patent No. 7,016,676. *Case no. IPR2019-01116.* Firm: Klarquist Sparkman. Declaration filed May 29, 2019. Second declaration filed May 19, 2020. Patent Trial and Appeal Board ruled challenged claims unpatentable, October 26, 2020.

Testifying expert for Microsoft. Inter Partes Review. U.S. Patent No. 6,993,049. *Case no. IPR2019-01026.* Firm: Klarquist Sparkman. Declaration filed May 6, 2019. Second declaration filed May 19, 2020.

Testifying expert for Ericsson. Inter Partes Review. U.S. Patent No. 7,016,676. *Case no. IPR2020-00376*. Firm: Haynes and Boone, LLP. Declaration of December 22, 2019.

Testifying expert for RPX. Inter Partes Review. U.S. Patent 7,245,917. *Cases no. IPR2018-01387, IPR2018-01388*. Firm: Klarquist Sparkman. Declaration filed July 13, 2018. Declaration for opposition to motion to amend filed August 8, 2019.

#### **Prior Patent-Litigation Cases as Testifying Expert (most recent on top)**

Testifying expert for Verizon. Non-infringement, U.S. Patent No. 9,642,024. Firm: Holland & Knight. Expert report on non-infringement July 17, 2019. Deposed August 9, 2019. Motion for summary judgement granted September 18, 2019.

Testifying expert for Fossil, non-infringement and invalidity, U.S. Patent No 6490443, *Freeny v. Fossil, case no. 2:18-cv-00049*. Firm: Fish & Richardson. Expert report on non-infringement, May 13, 2019. Expert report on invalidity April 22, 2019. Deposed May 21, 2019. Parties settled.

Testifying expert for Fossil. Inter Partes Review. U.S. Patent 6,490,443. *Case no. IPR2019-00755*. Firm: Fish & Richardson. Declaration filed April 1, 2019.

Testifying expert for Microsoft. Inter Partes Review. U.S. Patent 9,531,657. *Case no. IPR2017-01411*. Firm: Klarquist Sparkman. Declaration filed May 8, 2017. On November 28, 2018, the Patent Trial and Appeal Board ruled all claims to be unpatentable.

Testifying expert for Arris. Non-infringement and invalidity (one patent), *Sony v. Arris, ITC No. 337-TA-1049*. Firm: Fish & Richardson. Expert report on non-infringement, October 13, 2017. Expert report on invalidity September 27, 2017. Case settled in December 2017.

Testifying expert for Microsoft. Inter Partes Review. U.S. Patent 8,848,892. *Case no. IPR2017-01052*. Firm: Klarquist Sparkman. Declaration filed March 9, 2017. Deposed November 30, 2017. On September 19, 2018, the Patent Trial and Appeal Board ruled all claims to be unpatentable.

Testifying expert for Apple, non-infringement (three patents) and invalidity (two patents), *Unwired Planet v. Apple, case No. 13-cv-04134*. Firm: Gibson Dunn. Expert report on non-infringement January 12, 2015. Expert report on invalidity December 3, 2014; rebuttal-reply report on invalidity January 26, 2015. Deposed February 13, 2015. Case settled in April 2017.

Testifying expert for Google, Inter Partes Review.

U.S. Patent 5,809,428. *Case nos. IPR2017-00529, IPR2017-00530, and IPR2017-00559*. Three declarations filed December 30, 2016. Firm: Fish & Richardson. Parties settled as of May 2017 and IPR proceedings terminated.

U.S. Patent 5,754,946. *Case nos. IPR2017-00536 and IPR2017-00537*. Two declarations filed December 29, 2016. Firm: Fish & Richardson. Parties settled as of May 2017 and IPR proceedings terminated.

U.S. Patent 5,894,506. *Case nos. IPR2017-00532, IPR2017-00533, IPR2017-00534, and IPR2017-00535*. Four declarations filed December 28, 2016. Firm:

Fish & Richardson. Parties settled as of May 2017 and IPR proceedings terminated.

Testifying expert for RPX, Inter Partes Review.

U.S. Patents 8,135,342 and 8,879,987. *Case nos. IPR2016-01052, IPR2016-01053, and IPR2016-01054*. Declaration filed May 17, 2016. Firm: Klarquist Sparkman. January 2017, all IPRs were instituted on a majority of the claims in the petitions, and patent owner ultimately canceled all instituted claims.

U.S. Patents 8,135,342 and 8,879,987. *Case nos. IPR2016-00985 and IPR2016-00989*. Declaration filed April 30, 2016. Firm: Klarquist Sparkman. January 2017, both IPRs were instituted on a majority of the claims in the petitions, and patent owner ultimately canceled all instituted claims.

Testifying expert for Microsoft, invalidity and non-infringement (two patents), in *Eleven Engineering Inc. et al. v. Microsoft Corporation et al.*, No. 09-903-LPS (D. Del.). Firm: Fish & Richardson. Plaintiff conceded to non-infringement based on claim construction July 2016 prior to report submission.

Testifying expert for LG Electronics, non-infringement (one patent), in *Cellular Communication Equipment LLC v. LG Electronics, Inc., et al.*, Case no. 6:13-cv-00508 (EDTX). Firm: Mayer Brown. Case settled July 2016 prior to report submission.

Testifying expert for T-Mobile, non-infringement (five patents), *Intellectual Ventures v. T-Mobile US*, case no. 1:13-cv-01632-LPS. Firm: Gibson Dunn. Expert report May 26, 2016. Deposed September 20, 2016. Parties settled.

Testifying expert for Amazon, Barnes & Noble, MediaTek, Nokia, Samsung, Texas Instruments, invalidity (one patent), in *CSIRO v. MediaTek et al.*, Case No. 6:12-cv-578-LED-KNM. Firms: Covington & Burling, O'Melveny & Myers, Quinn Emanuel Urquhart & Sullivan, White & Case. Report on invalidity December 19, 2014. Deposed March 6, 2015. Case settled July 2015.

Testifying expert for Apple, invalidity (three patents) in *GPNE v. Apple*, case no. 12-CV-02885-LHK. Firm: Fish & Richardson. Report on invalidity January 4, 2014. Deposed February 20, 2014. Testified in court October 17 and October 20, 2014. Jury verdict of non-infringement on all three patents.

Testifying expert for HTC, invalidity (one patent), in *Nokia v. HTC, ITC Investigation No. 337-TA-847*. Firm: White & Case. Report 2013. Patent withdrawn from dispute.

### **Other Patent-Litigation Testimony**

Claim-construction declaration for Microsoft in *Eleven Engineering Inc. et al. v. Microsoft Corporation et al.*, No. 09-903-LPS (D. Del.), January 28, 2016. Case details above.

Claim-construction declaration for Apple in *Unwired Planet v. Apple*, April 7, 2014. Case details above.

Declaration "*In re Patent Application of Han-Jin JOH, 11/266,114*." Docket No. P2481US00, April 18, 2012. Firm: H.C. Park & Associates, PLC.



Declarations for Front Row Technologies in *Inter Partes Reexam*. 95/001,565, April 4, 2011; 95/001,568, March 7, 2011; 95/001,566, March 4, 2011. Firm: Black, Lowe & Graham PLLC.

### **Breach-of-Contract Litigation**

Testifying expert for Sprint, non-breach-of-contract, in *Truckstop.net vs. Sprint Communications*, Case No. CV-04-561-S-BLW. Firm: Moffatt Thomas. Report March 31, 2006, supplemental report September 28, 2006. Deposed May 3, 2007. Worked on case 2005 to 2010.

### **Consulting Expert History**

Consulting expert for Maynard, Coper & Gale. SMS technology review, Pre-Lit IPR. 2018.

Consulting expert for T-Mobile in *Intellectual Ventures v. T-Mobile USA*, No. 13-cv-1671, No. 14-cv-1232, No. 2:17-cv-00577-JRG. Firm: Kecker & Van Nest. 2016-2018.

Consulting expert for Huawei in UK litigation, *Unwired Planet International Limited v. Huawei Technologies (UK) Co., Limited and others*, Claim no. HP14 801038. Firm: Powell Gilbert. 2015-2016.

Consulting expert for Nokia in *Mobile Enhancement Solutions LLC v. Nokia Corp. et al.*, 3:13-cv-03977-M. Firm: King & Spalding. 2014.

Consulting expert for Amazon in *GPNE v. Amazon.com, et al.* No. 1-11-CV-00426. Firm: Klarquist Sparkman. 2012.

Consulting expert for Motorola in *Microsoft Corp. v. Motorola Mobility, Inc. - UK Litigation*. Claim No. HCII C04536. Firm: Powell Gilbert. 2012.

Consulting expert for Pantech in *GPNE v. Amazon.com, et al.*, No. 1-11-CV-00426. Firm: HC Park & Associates. 2012.

Consulting expert for SkyTel (Verizon) in *EON Corp. IP Holdings, LLC v. SkyTel, et al.*, Case No. 3:08-CV-385. Firm: Simpson, Thacher & Bartlett. 2009.

Consulting expert for Research in Motion in *Visto Corp. v. Research in Motion Corp.* Firm: Kirkland & Ellis. 2008.

Consulting expert for Starent Networks in *UT Starcom, Inc. v. Starent Networks, Corp.* No. 07 CV 2582. Firm: Finnegan, Henderson, Farabow, Garrett & Dunner. 2008.

Consulting expert for Apple in *Apple Computer/Creative Labs Patent Disputes*. Firm: Kirkland & Ellis. 2006.

Consulting expert for Samsung in *Reese v. Samsung Telecommunications America L.P. et al.*, Civil Action No. 2:05-CV-00415-DF. Firm: Kirkland & Ellis. 2006.

Consulting expert for Sanyo in *Antor Media Corporation v. Nokia, Inc., Utstarcom Personal Communications, LLC, Audiovox Communications Corp., Kyocera Wireless Corp., Sanyo North America Corp., Sharp Electronics Corp., NEC America, Inc., Research In Motion Corp., Virgin Mobile USA, LLC, LG Electronics Mobilecomm U.S.A., Inc., Palmone, Inc., and Panasonic Corp. of North America*, Case No. 2-05cv-186 LED. Firm: Kirkland & Ellis. 2005.

Consulting expert for Sanyo in *Zoltar Satellite Systems, Inc. [sic] v. LG Electronics Mobile Communications Co., et al.*, 2:05-CV-002150 LED. Firm: Foley & Lardner. 2005.

Consulting expert for Sanyo in *William Reber L.L.C. v. Samsung Electronics America, Inc., et al.* Civ. Action No. 03 C 4174. Firm: Foley Lardner. 2004.

## 5. Public Speaking

Peter Rysavy has spoken at more than 60 public events, such as conferences, as a keynote presenter, moderator, and panelist. See <https://rysavy.com/speaking/> for details.

## 6. Published Articles and Reports

The more-than-190 articles, reports, and white papers by Peter Rysavy, listed from most recent to oldest, include the following:

1. "DoD's proposed 5G spectrum sharing fraught with problems," October 2020. Article for Fierce Wireless.
2. "Global 5G: Rise of a Transformational Technology," September 2020. Report published by 5G Americas.
3. "Latest Tech Aims to Solve Riddle for Rural Broadband," August 2020. Article for Fierce Wireless.
4. "6 GHz Should Be Allocated for Both Licensed and Unlicensed Applications," March 2020. Article for Light Reading.
5. "Virtualization Will Transform the Wireless Industry," December 2019. Article for Fierce Wireless.
6. "Global 5G: Implications of a Transformational Technology," September 2019. Report published by 5G Americas.
7. "How Title II Net Neutrality Undermines 5G," June 2019. Report published by Rysavy Research.
8. "How the 'Save the Internet' Act Breaks 5G," May 2019. Article for Bloomberg Law.
9. "Bad Idea of Nationalized 5G Network Put to Rest," April 2019. Article for Fierce Wireless.
10. "Untangling C-band for a New Broadband Future," January 2019. Article for Fierce Wireless.
11. "Broadband Disruption: How 5G Will Reshape the Competitive Landscape—Second Edition," November 2018. Report published by Datacomm Research.
12. "LTE to 5G: The Global Impact of Wireless Innovation," August 2018. Report published by 5G Americas.
13. "Mid-Band Spectrum for 5G Needed Now," August 2018. Article published by Fierce Wireless.
14. "Small Cells – Suddenly Essential," March 2018. Article published by RCR Wireless.



15. "How 5G Will Solve Rural Broadband," January 2018. Article published by Fierce Wireless.
16. "The Power of Wireless Broadband," November 2017. Report published by Rysavy Research.
17. "Broadband Disruption: How 5G Will Reshape the Competitive Landscape," August 2017. Report published by Datacomm Research.
18. "Why 5G Will Be a Game Changer," August 2017. Article published by Fierce Wireless.
19. "LTE to 5G: Cellular and Broadband Innovation," August 2017. Report published by 5G Americas.
20. Declaration of Peter Rysavy. Exhibit to CTIA Comments to Federal Communications Commission, WC Docket No. 17-108, Restoring Internet Freedom. 2017.
21. "How "Title II" Net Neutrality Undermines 5G," April 2017. Report published by Rysavy Research.
22. "Accelerating Innovation in Unlicensed Spectrum," November 2016. Article published by Fierce Wireless.
23. "IoT & 5G: Wait or Move?" October 2016. Report published by Informa.
24. "Mobile Broadband Transformation," August 2016. Report published by 5G Americas.
25. "Threading the Spectrum Needle - Can LTE and Wi-Fi Coexist?" February 2016. Article published by Fierce Wireless.
26. "5G - Promises and Pitfalls," November 2015. Article published by RCR Wireless News.
27. "LTE and 5G Innovation: Igniting Mobile Broadband," August 2015. Report published by 4G Americas.
28. "Latest FCC Auction Shatters Spectrum Myths," January 2015. Article published by Gigaom.
29. "LTE Congestion Management - Enabling Innovation and Improving the Consumer Experience," January 2015. Report published by Mobile Future.
30. "Mobile Broadband Networks Should Not Be Hampered by Net Neutrality Constraints," September 2014. Article published by Fierce Wireless.
31. "How Wireless is Different - Considerations for the Open Internet Rulemaking," September 2014. Report for Mobile Future.
32. "Beyond LTE: Enabling the Mobile Broadband Explosion," August 2014. Report published by 4G Americas.
33. "Will LTE in Unlicensed Spectrum Unlock a Vast Store of Mobile Broadband Capacity?" June 2014. Article published by MIMO World.
34. "How will 5G compare to fiber, cable or DSL?" May 2014. Article published by Fierce Wireless.

35. "It's Time for a Rational Perspective on Wi-Fi," April 2014. Article published by Gigaom.
36. "Complexities of Spectrum Sharing - How to Move Forward," April 2014. Report published by Mobile Future.
37. "Canadian 700 MHz Auction: Analysis of Results." April 2014. Analysis of auction that concluded February 2014 in Canada.
38. "Challenges and Considerations in Defining Spectrum Efficiency," March 2014. Article for Proceedings of the IEEE.
39. "The High and Wide Future of Radio," March 2014. Column for Fierce Wireless.
40. "Uncertain Government Spectrum Policies Have Far-Reaching Consequences," November, 2013. Article for Bloomberg BNA Insights.
41. "Who Owns the Internet of Things?," September 2013. Column for Fierce Wireless co-authored with Chris Rezendes.
42. "Mobile Broadband Explosion - The 3GPP Wireless Evolution," August 2013. Report for 4G Americas.
43. "Learn How Technology Will Turn Less Desirable Airwaves into 'Beachfront' Spectrum," June 2013. Article for Gigaom.
44. "Efficiency of Spectrum Use," May 2013. Article for Fierce Wireless.
45. "2013 Mobile Commerce Survey," May 2013. Report for Information Week.
46. "Trends in Enterprise Cellular Network Data Usage," March 2013. Market research and report done in conjunction with NetMotion Wireless."
47. "White Spaces Networks Are Not "Super" Nor Even Wi-Fi," March 2013. Article for Gigaom.
48. "Mobile Commerce: State of the Market," February 2013. Coauthored report for Information Week.
49. "Vehicles and Mobility Are Converging but Fragmentation, Lack of Standards May Hinder Progress," February 2013. Column for Fierce Wireless.
50. "4G: Carriers, IT Pros Square Off," December 2012. Report for Information Week.
51. "Spectrum – All Options Essential, Including Incentive Auctions," December 2012. Blog for HighTech Forum.
52. "Spectrum Sharing with LTE is Conceivable But Not Trivial," November 2012. Column for Fierce Wireless.
53. "4G World: The Need For More Spectrum," October 2012. Column for Information Week.
54. "Spectrum Sharing Opens a Potential Attack Route," October 2012. Article for Gigaom.
55. "No Silver Bullets for FCC, NTIA Spectrum Challenge," September 2012. Article for Bloomberg BNA.

56. "Mobile Broadband Explosion – The 3GPP Wireless Evolution," September 2012. Report for 4G Americas.
57. "Spectrum Sharing – The Promise and The Reality," July 2012. Report for Mobile Future.
58. "Mobile Network Design and Deployment: How Incumbent Operators Plan for Technology Upgrades and Related Spectrum Needs," June 2012. Rysavy Research report.
59. "LTE: Huge Technology, Huge Challenges," March 2012. Report for Information Week.
60. "Wireless Spectrum Doomsday Looms," January, 2012. Column for InformationWeek.
61. "Unleashing the Wireless Power of Long-Term Evolution: Spectrum, and Lots of It," December 2011. Article for Bureau of National Affairs (BNA).
62. "Convergence of 3G/4G and Wi-Fi, October 2011. Report for InformationWeek.
63. "Comments on Citi 'Wireless Supply and Demand'," October 2011. Analysis and report.
64. "Mobile Broadband Explosion. 3GPP Broadband Evolution to IMT-Advanced (4G)," September 2011. Detailed report for 4G Americas.
65. "Public Safety Spectrum," July 2011. Analysis and report.
66. "Efficient Use of Spectrum," May, 2011. Report sponsored by CTIA, filed with the FCC.
67. "The Spectrum Imperative: Mobile Broadband Spectrum and its Impacts for U.S. Consumers and the Economy. An Engineering Analysis," March 2011. Report sponsored by Mobile Future.
68. "Application Mobilization: A Rapidly Changing Landscape," January 2011. Report published by Information Week.
69. "Smartphone Efficiency Report," January 2011. Rysavy Research report.
70. "Innovation Enabled by Mobile Wireless Network Management," Report sponsored by Mobile Future, filed with the FCC October, 2010.
71. "Strategic Use of Wi-Fi in Mobile Broadband Networks," October 2010, Rysavy Research white paper.
72. "Transition to 4G – 3GPP Broadband Evolution to IMT-Advanced," September 2010. Rysavy Research report for 4G Americas.
73. "Spectrum Shortfall Consequences," April 2010. Analysis written for CTIA and filed with the FCC.
74. "Beyond Smartphones," February, 2010. Article published by Information Week.
75. "Mobile Broadband Capacity Constraints And the Need for Optimization," February 2010. Rysavy Research report.



76. "The 2.6 GHz Spectrum Band - Unique Opportunity to Realize Global Mobile Broadband," December 2009. Report published by GSMA with Peter Rysavy providing the technology analysis on how best to manage the 2.6 GHz band.
77. "Net Neutrality Regulatory Proposals: Operational and Engineering Implications for Wireless Networks and the Consumers They Serve." Report sponsored by Mobile Future, filed with the FCC January, 2010.
78. "The Mobile Web Imperative," December 2010. Article published by Information Week.
79. "Air Pressure: Why IT Must Sort Out App Mobilization Challenges," October, 2009. Analytics report published by Information Week.
80. "Spectrum Crisis?" October, 2009. Article published by Information Week.
81. "HSPA to LTE-Advanced. 3GPP Broadband Evolution to IMT-Advanced (4G)" September 2009. Detailed report published by 3G Americas.
82. "3G Safeguards: Incomplete, Getting Better," May 2009. Article published by Information Week.
83. "Mobile Broadband Spectrum Demand," December 2008. Report commissioned by CTIA, released at CTIA Wireless March, 2009.
84. "Femtocells Suit Up For Work," January 2009. Article published by Information Week.
85. "Wireless E-Mail Efficiency Assessment," January 2009. Test report.
86. "HSPA Gets Uploads Almost Up To Download Speeds," September 2008. Article published by Information Week.
87. "EDGE, HSPA and LTE - Broadband Innovation," September 2008. White paper, published by 3G Americas.
88. "Code of the Road," August 2008. Article published by Information Week.
89. "Global Mobile," May 2008. Article published by Information Week.
90. "GPS Performance," March 2008. Test report.
91. "Mobile Application Development Quick Start Guide," March 2008. White paper, published by AT&T.
92. "Harnessing Mobile Middleware", December 2008. White paper published by AT&T.
93. "Security Requirements for Wireless Networking," December 2007. White paper.
94. "Mobile Application Development Best Practices," September 2007. Peter Rysavy co-wrote this white paper, published by AT&T.
95. "EDGE, HSPA, LTE: The Mobile Broadband Advantage", September 2007, White Paper for 3G Americas
96. "Handheld Computing Evolution", June 13, 2007, Network Computing Mobile Observer

97. "Reach Me if You Can", article on wireless application deployment, May 2007, Network Computing Magazine
98. "Global Mobile", May 23, 2007, Network Computing Mobile Observer
99. "Wireless Networks, Wired Bottlenecks", May 2, 2007, Network Computing Mobile Observer
100. "Breaking the Gray Flannel Ceiling", article on mobile IM, April 2007, Network Computing Magazine
101. "QoS and VoIP With 3G: Not an Easy Marriage", Apr 11, 2007, Network Computing Mobile Observer
102. "Mobile Linux Puzzle - Coming Together." March 2007, Network Computing Magazine.
103. "Learning from Bluetooth", Mar 21, 2007, Network Computing Mobile Observer
104. "Disconnect!", Feb 28, 2007, Network Computing Mobile Observer
105. "EV-DO Rev A: Upping the Ante", Feb 7, 2007, Network Computing Mobile Observer
106. "IEEE 802.11n for the Enterprise—Not a Trivial Upgrade", Jan 17, 2007, Network Computing Mobile Observer
107. "Google Embraces Mobile", Dec 20, 2006, Network Computing Mobile Observer
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109. "Evolved EDGE and the Future of TDMA", Oct 18, 2006, Network Computing Mobile Observer
110. "Wireless E-Mail Efficiency Assessment." Oct 13, 2006. White paper that presents the results of a detailed engineering assessment to compare network efficiency of RIM Blackberry versus Microsoft Direct Push.
111. "Mobile Broadband: EDGE, HSPA & LTE", Sep 2006. White paper published by 3G Americas.
112. "Mobile Computing Policy and De-Perimeterization", Sep 27, 2006, Network Computing Mobile Observer
113. "Trials and Tribulations in Assessing Wireless Network Performance", Sep 6, 2006, Network Computing Mobile Observer
114. "Time to Decide", article on wireless networking, Aug 31, 2006, Network Computing Cover Story
115. "Sprint Nextel, WiMAX and the Mobile Broadband Conundrum", Aug 16, 2006, Network Computing Mobile Observer
116. "Wide-Area Wireless—The Next Five Years", Jul 26, 2006, Network Computing Mobile Observer

117. "Anatomy of a Well-Designed Wireless Application", Jul 5, 2006, Network Computing Mobile Observer
118. "Wireless Network Assessment, EVDO and WiFi Hotspots." A detailed test report on the relative performance of CDMA2000 EVDO and WiFi hotspots. March 21, 2006.
119. "Using Your Cell Phone as a Modem", Jun 14, 2006, Network Computing Mobile Observer
120. "Convergence Update: IMS and UMA", May 24, 2006, Network Computing Mobile Observer
121. "Mobile Broadband - Trying to Catch a Fast-Moving Target", May 3, 2006, Network Computing Mobile Observer
122. "Integrated Voice/Data in 3G", Apr 12, 2006, Network Computing Mobile Observer
123. "Mobile Middleware in the Broadband Era", Mar 22, 2006, Network Computing Mobile Observer
124. "Figuring Out Metro Wi-Fi", Mar 1, 2006, Network Computing Mobile Observer
125. "Sprint Nextel's Jump to the Future", Feb 8, 2006, Network Computing Mobile Observer
126. "The Smartphone Conundrum", Jan 18, 2006, Network Computing Mobile Observer
127. "Municipal and Mesh Wi-Fi", Dec 21, 2005, column, Network Computing Mobile Observer
128. "Linksys WRT54G -- Not What It Used to Be", Nov 30, 2005, column, Network Computing Mobile Observer
129. "Confusion About 4G", Nov 9, 2005, column, Network Computing Mobile Observer
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131. "Hard Numbers and Experts' Insights on Migration to Evolved 3G and 4G Wireless Technology", Oct, 2005, updated public report, published by Datacomm Research
132. "Wireless Data Pricing--One Hundred Times Less Expensive and Still Not Satisfied", Oct 19, 2005, column, Network Computing Mobile Observer
133. "Secure Mobile Access Using SSL VPNs", Oct 2005, white paper, published by Aventail
134. "Embedded Wireless WAN", Sep 28, 2005, column, Network Computing Mobile Observer
135. "Redefining the Endpoint--Wireless Broadband Routers", Sep 7, 2005, column, Network Computing Mobile Observer



136. "Data Capabilities: GPRS to HSDPA and Beyond", Sep 2005, white paper, published by 3G Americas
137. "High Speed Downlink Packet Access (HSDPA)", Aug 17, 2005, column, Network Computing Mobile Observer
138. "The Uneven Uptake of Wireless Data", Jul 21, 2005, column, Network Computing Mobile Observer
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141. "Freed Up or Tied Down", Jul 21, 2005, article, Network Computing Magazine
142. "Wireless E-Mail for the Masses", Jun 15, 2005, column, Network Computing Mobile Observer
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153. "Making the Smart Choice (Smartphone and Wireless PDA Platform Review)", Apr 15, 2004, article, Network Computing Magazine
154. "Wireless Instant Messaging: Propelling SMS and Desktop IM to the Next Level", Oct 27, 2003, public report, published by Datacomm Research
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156. "Data Capabilities for GSM Evolution to UMTS", Nov 19, 2002, white paper, published by 3G Americas.

157. "Wireless Nirvana", Oct 21, 2002, article, Network Computing Magazine
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159. "Networking Standards and Wireless Networks", 2002, white paper, published by NetMotion Wireless
160. "Public Wireless LANs: Challenges, Opportunities and Strategies", Jul 9, 2001, public report, published by Datacomm Research
161. "Break Free With Wireless LANs", Oct 29, 2001, article, Network Computing Magazine
162. "MMDS Struggles to Find a Foothold", Oct 29, 2001, article, Network Computing Magazine
163. "Can MWIF Unify Cellular Protocols?", May 2001, column, M-Business Magazine
164. "M-Wallets: Not Ready Yet", Apr 2001, column, M-Business Magazine
165. "AT&T's GSM Move Could Ignite U.S. Market", Mar 2001, column, M-Business Magazine, March 2001
166. "Lessons From I-Mode", Feb 2001, column, M-Business Magazine
167. "E-Commerce Unleashed", Jan 22, 2001, article, Network Computing Magazine
168. "Mobile-Commerce ASPs Do the Legwork", Jan 22, 2001, article, Network Computing Magazine.
169. "Big Step to Mobile Payments", Jan 2001, column, M-Business Magazine.
170. "Emerging Technology: Clear Signals for General Packet Radio Service", Dec 2000, article, Network Magazine.
171. "WAP: Untangling the Wireless Standard", Nov 2000, article, Network Computing Magazine
172. "The Road to a Wireless Future", Oct 30, 2000, article, Network Computing Magazine
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174. "Managing Mobile Code", Aug 23, 1999, online manual, Network Computing Magazine.
175. "The Evolution of Cellular Data: On the Road to 3G", 1999, article published by Intel "On The Road To PCS", February 15, 1996, article, Network Computing Magazine.
176. "Wireless IP - A Case Study", Apr 30, 1999, article, PCS Data Today online journal

177. "Broadband Wireless: Now Playing in Select Locations", Oct 7, 1999, article, Data Communications Magazine
178. "Satellite Services: Don't Join the Space Race", Sep 21, 1999, column, Data Communications Magazine
179. "Making the Case for Fixed Wireless Technology", Jul 1999, column, Data Communications Magazine
180. "Wireless IP: Ready to Lift Off?", Mar 1999, column, Data Communications Magazine.
181. "Planning and Implementing Wireless LANS", 1999, online manual, Network Computing Magazine.
182. "Wireless Broadband and Other Fixed-Wireless Systems", 1998, online manual, Network Computing Magazine.
183. "General Packet Radio Service (GPRS)", September 30, 1998, GSM Data Today online journal.
184. "Wide-Area Wireless Computing", 1997, online manual, Network Computing Magazine.
185. "Internet-To-Go, Now With Mobile IP", November 1, 1997, article, Network Computing Magazine.
186. "Making The Call With Two-Way Paging", January 15, 1997, article, Network Computing Magazine.
187. "Cellular Data Communications Made Easy", July 1, 1997, article, Network Computing Magazine.
188. "Wireless Data Made To Order", March 15, 1996, article, Network Computing Magazine.
189. "TCP/IP: The Best Protocol for Remote Computing", public white paper, WRQ. 1996.
190. "Message Middleware In A Wireless Environment", April 15, 1996, article, Network Computing Magazine.
191. "On The Road To PCS", Feb 15, 1996, article, Network Computing Magazine
192. "The ABCs of PCS," Nov 7, 1994, article, Network World.

## 7. Wireless Courses

The following lists the public courses that Rysavy Research has taught. These are listed in the order of most recent to oldest. Rysavy Research has also privately taught on wireless technology at AT&T, Bluetooth SIG, Cingular Wireless, Cricket Communications, Intel, Medtronic, Microsoft, NetMotion Wireless, RIM, Tektronix, Teledyne, T-Mobile, and the U.S. Department of Defense.

1. Interop Conference, Las Vegas, May 2013. "Wireless Everywhere: LTE and Beyond," 1 hour course.



2. Bellevue, WA, April 2013. "4G: Deep Technology Insights," 1 day course.
3. Interop Conference, Las Vegas, May 2012. "LTE Update," 1 hour course.
4. Bellevue, WA, April 2012. "Mobile Broadband Explosion," 1 day course.
5. Redmond, WA, December 2010. "Mobile Broadband - Technology Evolution and Strategic Considerations," 1 day course.
6. Portland, OR, November 2010. "Mobile Broadband - Technology Evolution and Strategic Considerations," 1 day course.
7. AT&T Developer Program, March 2010, "Guidelines for Delivering Streaming Services on AT&T's Wireless Network," 1 hour webcast.
8. Bellevue, WA, Oct 2009. "Mobile Broadband - Entering the 4G Decade," 1.5 hour session at IEEE Wireless Workshop.
9. Bellevue, WA, Apr 2009. Portland, OR, May 2009. "Mobile Broadband Innovation - 3G to 4G Evolution and Impacts," 1 day course.
10. 3G Americas, Dec 2008, "EDGE, HSPA, LTE - Broadband Innovation," 1 hour webcast.
11. AT&T Developer Program, August 2008, "Broadband Innovation - Applications for New Broadband Networks," 1 hour webcast.
12. AT&T Developer Program, June 2008, "Emerging Mobile Application Architectures," 1 hour webcast.
13. AT&T Developer Program, March 2008, "Understanding Mobile Application Development Environments: Open Platforms, Tools, Capabilities, Developer Strategies," 1 hour webcast.
14. AT&T Developer Program, Dec 2007, "Harnessing Mobile Middleware - Architectures, Functions and Integration," 1 hour webcast.
15. AT&T Developer Program, Sep 2007, "Best Practices for Mobile Application Development - Strategies, Considerations, and Techniques for Optimal Development," 1 hour webcast.
16. AT&T Developer Program, Apr 2007, "How Enterprises Can Get Ready for IP Multimedia Subsystem (IMS): IMS Strategies and Application Development Approaches," 1 hour webcast.
17. Bellevue, WA, May 2006, "Evolution of Mobile Broadband", 1 day course.
18. Portland State University, Apr 2006, "Wireless Technology Advances: Wi-Fi, 3G, WiMAX, Mobile Broadband", 1 day course.
19. Portland State University, Sep 2005, "3G, Evolved 3G, 4G and WiMAX", 1 day course.
20. Bellevue, WA, April 2005, "Wireless Technology Advances", 1 day course.
21. CTIA Wireless Data University, Mar 2005, "Wi-Fi and WiMAX in Detail", half day course.

22. Portland State University, Jan 2005, "Wi-Fi Technology - Evolution and Integration", 1 day course.
23. CTIA Wireless Data University, Oct 2004, Wi-Fi - Technology, Evolution, Adoption and Hotspots, Added Section: WiMAX", half day course.
24. Portland State University, Jun 2004, "3G, WiMAX and other Wide-Area Broadband Wireless Networks", 1 day course.
25. CTIA Wireless Data University, Mar 2004, "Wi-Fi - Technology, Evolution, Adoption and Hotspots", half day course.
26. Portland State University, Nov 2003, "Wi-Fi - Evolution, Adoption and Hotspots", 1 day course.
27. CTIA Wireless Data University, Oct 2003, "Wi-Fi Technology - Evolution, Adoption and Hotspots", half day course.
28. IEEE Wireless LAN Conference, 2002, "Wireless LAN Business and Marketing Issues", 1 hour.
29. Portland State University, 2002, "WLANs, 3G Cellular and Beyond", 2 day course.
30. Portland State University, 2001, "Next Generation Cellular Data", 1 day course.
31. CMP Web 2001, "The Wireless Web in Detail", 1 day course.
32. IEEE Chapter Evening Presentation, 2001, "Wireless Networking Advances - Setting Reasonable Expectations", 2 hours.
33. UCLA, 2001, "Wireless Data Systems", 1 day course.
34. CMP Web 2000, "Wireless Data Networks", 1 day course.
35. UCLA, 2000, "Wireless Data Systems", 2 day course.
36. UCLA, 1999, "New Third Generation Cellular, Digital PCS and Broadband Mobile Data - What Will Dominate?", 4 day course co-taught with C. R. Baugh Ph.D.
37. Portable Design Conference, 1999, "Wireless Data Integration", 1 day course.
38. Northcon, 1998, "Wireless Data Networking Advances", 1 day course.
39. UCLA, 1998, "Technologies for Wireless Competitive Markets: Cellular, PCS and Wireless Data", 4 day course co-taught with C. R. Baugh Ph.D.
40. UCLA, 1997, "Cellular, PCS and Wireless Data Technology", 4 day course co-taught with C. R. Baugh Ph.D.
41. UCLA, 1996, "Wireless Voice And Data Communications (Personal Communications Services, Digital Cellular, and Wireless Data)", 4 day course co-taught with C. R. Baugh Ph.D.
42. UCLA, 1995, "Wireless Voice And Data Communications (Personal Communications Services, Digital Cellular, and Wireless Data)", 4 day course co-taught with C. R. Baugh Ph.D.



43. UCLA, 1994, "Wireless Voice And Data Communications (Personal Communications Services, Digital Cellular, and Wireless Data)", 4 day course co-taught with C. R. Baugh Ph.D.

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