

**UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

In Re: U.S. Patent 7,657,018 : Attorney Docket No. 066303.0616  
Inventor: David Matthew Smith :  
Filed: November 29, 2005 :  
Issued: February 2, 2010 : IPR No. Unassigned  
Assignee: Metaswitch Networks Ltd  
Title: Method and System for Combining a Conversion between Time-  
Division Multiplexed Digital Signals and Packetized Digital Signals  
with a Switching System Interface

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*Submitted Electronically via the Patent Review Processing System*

**DECLARATION OF SEAMUS GILCHRIST  
UNDER 37 C.F.R. § 1.132**

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### **Declaration of Seamus Gilchrist**

I, Seamus B. Gilchrist, declare as follows:

1. I have been retained as a technical expert on behalf of GENBAND (“Genband”) in connection with the above-captioned *inter partes review* (“IPR”) of U.S. Patent No. 7,657,018 (“the ‘018 Patent”). I understand that the ‘018 Patent is currently assigned to Metaswitch Networks Ltd.

2. I am familiar with the technology at issue in the period prior to October 22, 2004, which I understand is the earliest possible priority date for the ‘018 Patent.

3. I have reviewed Genband’s *Petition for Inter Partes Review of Claims 1, 2, 7, 8, 10, 13 and 14 of U.S. Patent No. 7,657,018* (“Petition”), including Exhibits Ex. 1001-1008 thereto. I make this declaration in support of the Petition.

4. I have been asked to provide my technical opinion on concepts discussed in the ‘018 Patent and the reference documents, as well as my technical opinion on how these concepts relate to several ‘018 Patent claim limitations in the context of the specification.

5. I have been asked to consider how a person of ordinary skill in the art would understand the claims of the ‘018 Patent and the applied reference combinations. In reaching the opinions stated herein, I have considered the ‘018

Patent and the references listed in Section VI of this declaration in the context of my own education, training, research, knowledge, and personal and professional experience.

6. I am being compensated at my standard hourly rate of \$275.00 per hour. My compensation is not dependent on the outcome of this IPR and in no way affects the substance of my statements in this declaration.

7. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.

8. This declaration is a statement of my opinions on issues related to the unpatentability of claims 1, 2, 7, 8, 10, 13 and 14 of the '018 Patent.

## **I. Background and Qualifications**

9. My qualifications are stated more fully in my curriculum vitae. *See* Ex. 1008. Here I provide a brief summary of my qualifications:

10. I received a Bachelor of Science Degree in Math with a minor in Computer Science from Iowa State University in 1983. I received a Master of Science Degree in Electrical and Computer Engineering from Iowa State University in 1985.

11. In addition to my educational background, I have over twenty-five years of experience in all aspects of the telecommunications industry including system design, product development, product management, marketing, sales and

business development. My technical expertise in global public network communications technology and protocols includes Class 5 public network switching, packet network routing, IETF RFCs, Voice over IP, Signaling System Number 7, IETF SigTran protocols, SIP, IMS, call processing, call routing, content distribution, firewall/proxy, Ethernet switching, deep packet Inspection, wireless communications, Asynchronous Transfer Mode and xDS1 access technologies and cable infrastructure.

12. I have held various other positions in the telecom industry over the past twenty-five years. From 1985 to 1987 I was a staff analyst at E.I. Du Pont de Nemours and Company. There I was a lead technical consultant for the topological design and performance analysis of a worldwide packet switching network.

13. From 1987 to 1997, I held the roles of Senior Consultant, Product Manager, and Director of Strategic Initiatives at DGM&S. As a Senior Consultant, I designed Signaling System 7 software. I was also involved in the review of contributions to the ITU-T Q.2140 (B-ISDN Signaling ATM Adaptation Layer) standards body. As Product Manager, I introduced new SS7 (PCS-1900, AIN, INAP, GSM, IS41, ISUP, MTP) and ATM technology products.

14. From 1997 to 1998, I was Chief Technology Officer at SDL, Inc. My role included integrating SS7 and ATM technologies into SDL's existing wide area

network technology base.

15. In 1998, I founded S-Link Corp., a privately held, pioneering company in the area of Signaling over IP technologies. I led it to a successful acquisition by RadiSys in 2001. In my role at S-Link, I developed corporate alliances and OEM relationships with leading global equipment manufacturers. I provided technology and product direction for the softswitch, signaling and Voice over IP markets. I also possess significant market knowledge of the telecommunications industry.

16. At RadiSys, I was Vice President of the Communications Systems Group. I was responsible for engineering, sales, product marketing, service and support for all of the signaling products.

17. From 2003 to 2005, I consulted for ConNetCom, Inc. I designed a distributed switching system that included SIP to SS7 interworking and GSM gateway capabilities. I was also responsible for planning network migration from a PSTN to a packet based infrastructure.

18. I served as Vice President of Voice Technology for Sedna Services, Inc. from 2005 to 2008. There I was responsible for recommendations on licensing and purchasing of intellectual property. I analyzed patent portfolios related to Voice over IP in the cable industry, which included comprehensive research of softswitch, media gateway and signaling related patents.

19. I currently perform patent analysis for ConNetCom, Inc. as a consultant. My analysis areas includes switching, routing, firewall, SBCs, VoIP, optical, wireless, software, wireline and cable technology, standards tracking, content distribution, IT infrastructure, mobile messaging transcoding and adaptation, VoIP patent landscape and market analysis, 3G standards, and mobile messaging.

20. I am also a named inventor on seven U.S. Patent Applications related to signaling in a packet switched network. See U.S. Patent Application Nos. 2004/0008735; 2004/0008734; 2003/0235207; 2003/0233612; 2003/0231654; 2003/0231643; 2003/0231622.

## **II. Legal Understanding**

21. My opinions are also informed by my understanding of the relevant law. I understand that the patentability analysis is conducted on a claim-by-claim basis and that there are several possible reasons that a patent claim may be found to be unpatentable.

22. I understand that earlier publications and patents may act to render a patent unpatentable for one of two reasons: (1) anticipation and (2) obviousness.

### **A. Anticipation**

23. First, I understand that a single piece of prior art “anticipates” a claim if each and every element of the claim is disclosed in that prior art. I further

understand that, where a claim element is not explicitly disclosed in a prior art reference, the reference may nonetheless anticipate a claim if the missing claim element is necessarily present in the apparatus or a natural result of the method disclosed—i.e. the missing element is “inherent.”

## **B. Obviousness**

24. Second, I understand that the prior art may render a patent claim “obvious.” I understand that two or more pieces of prior art that each disclose fewer than all elements of a patent claim may nevertheless be combined to render a patent claim obvious if the combination of the prior art collectively discloses all elements of the claim and one of ordinary skill in the art at the time would have been motivated to combine the prior art. I understand that this motivation to combine need not be explicit in any of the prior art, but may be inferred from the knowledge of one of ordinary skill in the art at the time the patent was filed. I also understand that one of ordinary skill in the art is not an automaton, but is a person having ordinary creativity. I further understand that a single piece of prior art that discloses fewer than all of the elements of a patent claim may render a patent claim obvious if including the missing element would have been obvious to one of skill in the art (e.g. the missing element represents only an insubstantial difference over the prior art or a reconfiguration of a known system).

25. I understand that a patent claim is obvious if the differences between



the subject matter claimed and the prior art are such that the subject matter as a whole would have been obvious at the time of the invention. I understand that the obviousness analysis must focus on the knowledge available to one of skill in the art at the time of the invention in order to avoid impermissible hindsight. I further understand that the obviousness inquiry assumes that the person having ordinary skill in the art would have knowledge of all relevant references available at the time of the invention.

### **C. Written Description and Enablement**

26. I understand that a patent specification must describe the invention sufficiently so that one of ordinary skill in the art would understand that the inventor possessed the subject matter claimed and, separately, must teach one of ordinary skill in the art how to make and use the invention.

### **D. Priority of Continuation Application**

27. I understand that, for a continuation application claiming the benefit of a prior-filed nonprovisional application under 35 U.S.C. 120, the later-filed application must be co-pending with the prior application or with an intermediate nonprovisional application similarly entitled to the benefit of the filing date of the prior application.

### **E. Claim Construction**

28. I understand that claims are to be interpreted (or “construed”)

consistent with the ordinary meaning the claim language would have to a person of ordinary skill in the art. I further understand that the claims should be construed consistent with the patent's intrinsic record, which includes the patent itself as well as the prosecution history. I understand that a patentee can act as his own "lexicographer" by explicitly defining claim terms in the body of the patent. Moreover, I understand that extrinsic evidence (including, for example, technical dictionaries and treatises) may shed light on the meaning claim terms would have to one of ordinary skill in the art. I also understand that, where extrinsic evidence conflicts with the intrinsic record, the intrinsic record governs the meaning of claim terms. I further understand that in proceedings before the United States Patent and Trademark Office, claim terms are given their broadest reasonable construction in light of the specification.

### **III. Level of Ordinary Skill in the Art**

29. In my opinion, as of the October 22, 2004 priority date of the '018 Patent, a person of ordinary skill in the art (POSITA) would have been someone with a Bachelor's Degree in electrical engineering, computer science, or a related scientific field, and at least two years of work or research experience in the telecommunications industry, which could include telecommunications device design, telecommunications software development, or related areas. Alternatively, a POSITA in the relevant timeframe would have been someone with an advanced

degree, such as a Master's Degree, in electrical engineering, computer science, or a related scientific field, focusing on telecommunications technology. Alternatively, a POSITA in the relevant timeframe could have been someone lacking formal technical education but having experience in the telecommunications industry that would be equivalent to such education.

#### **IV. OVERVIEW OF THE '018 PATENT**

##### **A. Summary of the Technology**

30. The '018 Patent incorporates the teachings of the '273 Patent by reference. Ex. 1001, 1:14-20. Thus, in describing some aspects of the '018 Patent, this Declaration also references text and figures of the '273 Patent.

31. The '018 Patent relates to a Class 5 digital switching system. Ex. 1001 at 1:25-30. A digital switching system routes calls in a telecommunication network. *Id.* The Class 5 designation refers to a telecommunications switching system for connecting calls between end-user devices, such as residential telephones, and the telecommunications service provider's network. *See* Ex. 1003 at 1:32-44.<sup>1</sup> Components of a Class 5 switch include a common control and switch

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<sup>1</sup> The class designation refers to the general functionality of the switch. For example, a Class 5 designation refers to a telecommunications switch that connects end users to the telecommunications network, whereas a Class 4 designation refers to a telecommunications switch that connects between other telecommunications switches (e.g., Class 5 switches and/or other Class 4 switches). Commercial examples of a Class 5 switch include the Nortel DMS-100, Siemens EWSD, and the Lucent 5ESS.

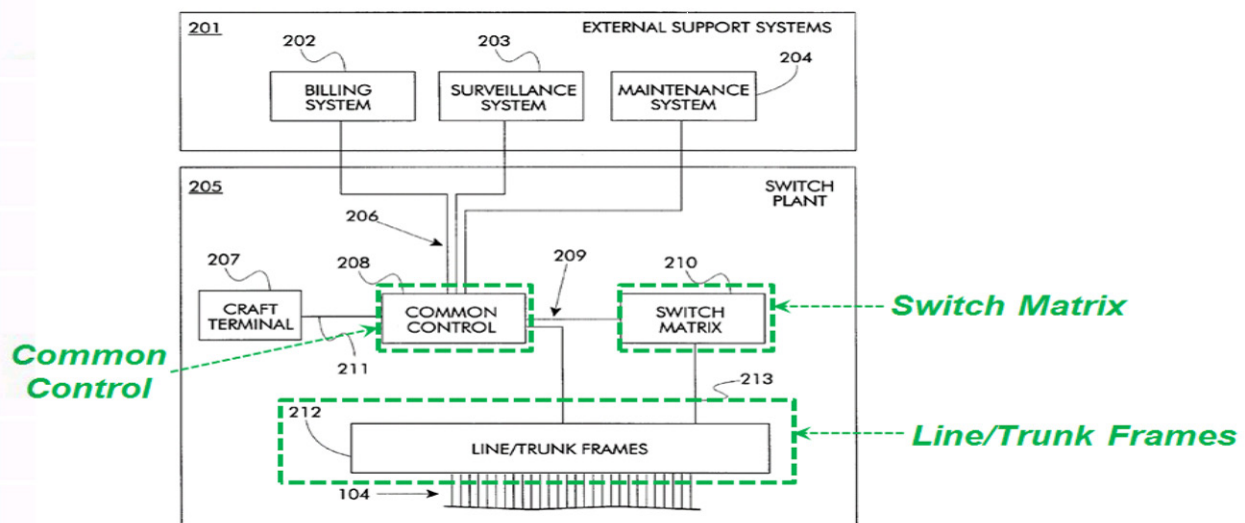
matrix. *See Id.*, 1:45-51, 1:60-64. The common control performs call processing and manages the switch matrix. *Id.*, 1:66-2:5. The switch matrix connects to line frames and trunk frames. Line frames and trunk frames refer to electronics that interface with a main distribution frame (MDF) that extends out to the network. For example, the MDF may extend to lines connected to end users or to trunks connected to other switches. During a call, the common control manages the switch matrix by instructing the switch matrix to connect a line frame to a trunk frame (if the call is between subscribers on different switches) or to another line frame (if the call is between subscribers on the same switch). *See Id.*, 1:63-66, 1:30-59, FIGS. 1-2.

32. According to the ‘273 Patent, the traditional telecommunications central office (also referred to as a Class 5 central office) should be updated to address telecommunications deregulation and various other industry trends that changed the demands placed on the network. *See Ex. 1003*, 2:16-3:45. For example, deregulation mandated by the U.S. Telecommunications Act of 1996 opened up new opportunities by giving third parties access to the incumbent central office. Thus, an industry trend in the years leading up to the filing of the ‘018 Patent was to interwork third party equipment with equipment in the incumbent central office.

33. Replacing all of the equipment and cabling in the Class 5 central

office would be difficult and extremely expensive. *Id.* 1:30-34. (“The class 5 central office houses substantial amounts of both equipment and cabling that is designed for a service life measured in decades, because it is extremely difficult and expensive to undertake replacement.”). Thus, the ‘273 Patent proposes bypassing certain outdated components, such as the common control and switch matrix, while retaining other components that are still serviceable, such as the legacy line/trunk frames. *Id.* 3:46-54.

34. Figure 2 of the ‘273 Patent (reproduced below) illustrates the traditional Class 5 central office, including common control 208, switch matrix 210, and line/trunk frames 212.

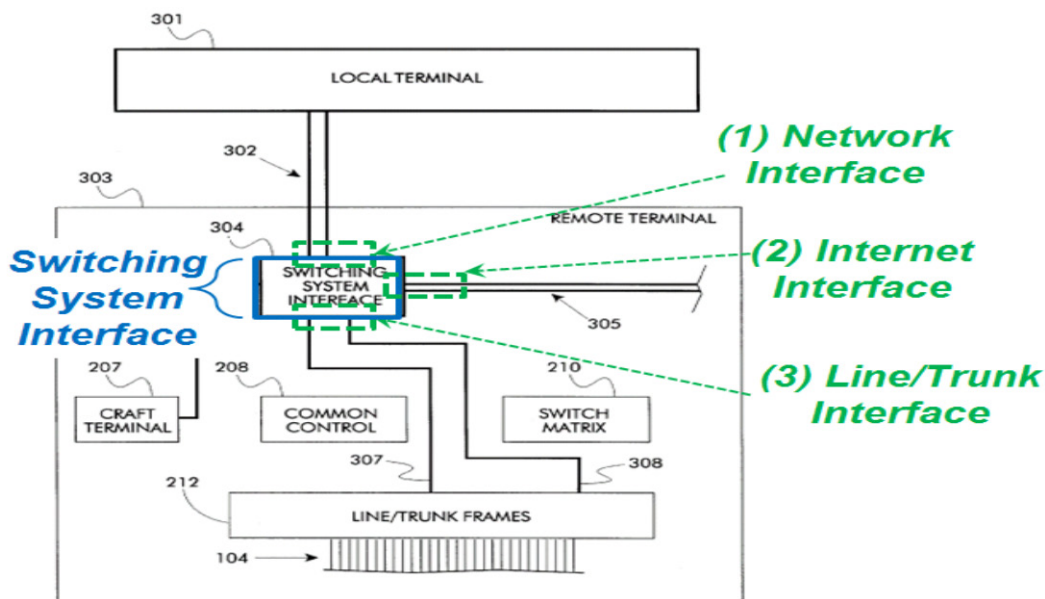


**Ex. 1003 (‘273 Patent) at Figure 2 (annotated)**

35. The ‘273 Patent describes a switching system interface that bypasses the legacy common control and switch matrix. *Id.* 3:40-54. Figure 3 of the ‘273

Patent illustrates the switching system interface 304 that operates legacy line/trunk frames 212 while bypassing legacy common control 208 and switch matrix 210. Figure 3 has been annotated below to highlight three types of interfaces in the switching system interface 304:

- (1) *Network Interface*: connects the switching system interface 304 to a digital transmission facility 302, such as a DS1 or DS3. Digital transmission facility 302 connects the switching system interface 304 to a local terminal 301 (e.g., a switch). *See e.g.*, Ex. 1003 at Abstract, 3:55-67, 4:51-60, 5:29-31, 7:1-5, 9:10-13, 9:23-24, FIGS. 3, 6, and 8. The '273 Patent describes the local terminal (301) as part of a digital loop carrier (DLC) architecture. Industry standards, such as GR-303-CORE, govern the DLC architecture. Ex. 1003 at 4:1-8.
- (2) *Internet Interface*: connects to an internet-dedicated trunk 305 that can divert internet (packet) traffic away from local terminal 301. *See e.g.*, Ex. 1003 at 2:47-51, 7:7-9, 7:46-50, FIGS. 3 and 6.
- (3) *Line/Trunk Interface*: connects to legacy line/trunk frames 212. The line/trunk interface uses a proprietary signal format that was used by the old common control and switch matrix (prior to being bypassed) to communicate with line/trunk frames 212. *See e.g.*, Ex. 1003 at 4:51-60, 6:27-40, 6:62-67, 7:9-32, 8:1-56, FIGS. 3-9.



**Ex. 1003 ('273 Patent) at Figure 3 (annotated excerpt)**

36. The '018 Patent combines a switching system interface for bypassing the common control and switch matrix with a conversion between time-division multiplexed signals and packetized digital signals. Ex. 1001, 3:34-41. The background of the '018 Patent acknowledges that the switching system interface for bypassing the common control and switch matrix was previously disclosed in the '273 Patent. Ex. 1001, 1:45-51. The background sections of both the '273 Patent and the '018 Patent acknowledge that converting between time-division multiplexed signals and packetized signals was known and could be performed using media gateways. Ex. 1001 at 2:8-11; Ex. 1003 at 2:56-59.

37. My own industry experience confirms that such media gateways existed at this time. Thus, it is my opinion that media gateways for converting TDM signals to packetized signals were well-known as of the earliest possible

priority date of the '018 Patent.

38. Figure 3 of the '018 Patent illustrates the switching system interface of the '018 Patent. The '018 Patent describes the switching system interface as having an “original” switching system interface portion. Ex. 1001, 5:47-53. The original portion includes the same types of interfaces as the switching system interface disclosed in the '273 Patent. Specifically, the original switching system interface of the '018 Patent includes a line trunk interface 301 and a DS1 interface 302. Ex. 1001, 5:47-53 (the original switching system interface also includes a timeslot interchange function 303 and pulse code modulation (PCM) busses 304 and 307).

39. Figure 3 of the '018 Patent has been annotated below to show that the '018 Patent has the same types of interfaces as those described above with respect to the '273 Patent. The interfaces include (1) the network interface, (2) the internet interface, and (3) the line/trunk interface. In the '018 Patent, these interfaces correspond to DS1 302, format converter 312, and line trunk interface 301, respectively.





TDM to packets and diverts the packets to an IP switch); 6:45-48 (format converter 312 makes calls “over a packet network,” such as “a local area network (LAN) or the Internet”).

(3) *Line/Trunk Interface*: The “line trunk interface” in the ‘018 Patent is the same type of interface as the line/trunk interface described above with respect to the ‘273 Patent. Like the line/trunk interface in the ‘273 Patent, the line trunk interface in the ‘018 Patent connects to legacy line/trunk frames. *See e.g.*, Ex. 1001 at 5:40-53 (the original switching system interface includes “line trunk interfaces” that “transmit[] the PCM data to legacy line/trunk frames”); claim 1 (a “switching system interface having ... at least one line/trunk interface, compatible with internal signals used to operate the line/trunk interface of a class 5 digital switching system”).

40. Thus, although the ‘018 Patent includes different figures than the ‘273 Patent, it is my opinion that the switching system interface illustrated in the ‘018 Patent contains the same types of interfaces as the switching system interface illustrated in the ‘273 Patent.

### **B. Summary of the Claimed Subject Matter**

41. The independent claims of the ’018 Patent relate to an interface that bypasses the common control and switch matrix of a Class 5 switch and converts

TDM digital signals to packetized digital signals. As discussed below, these concepts were known in the prior art. The dependent claims merely add obvious implementation details that were also known in the prior art.

## **V. CLAIM CONSTRUCTION**

42. I understand that a claim in an IPR proceeding is given its broadest reasonable construction in light of the specification. I understand that means-plus-function claims are construed to cover corresponding structure described in the specification and equivalents thereof. I understand that in the related district court litigation, the Patent Owner has identified the function and corresponding structure of the means-plus-function terms in the '018 Patent. I understand that the broadest reasonable interpretation of these terms can be no broader than the construction identified by the Patent Owner. Thus, for purposes of this Declaration, I have applied the Patent Owner's interpretation in order to meaningfully discuss the invalidity of the claims in view of the prior art.

43. *Means for bypassing (Claims 1 and 7).* I understand that in the related district court case, Patent Owner Metaswitch identifies the function as "bypassing a common control and switch matrix of a class 5 digital switch" and the corresponding structure as "line/trunk interfaces, DS1 interfaces, and equivalents thereof." It is my opinion that the extent of any structure in the '018 Patent for the line/trunk and DS1 interfaces appears at 1:52-64; 2:15-29; 5:7-46; FIGS. 2, 3.

44. *Switching means (Claims 1 and 7).* I understand that in the related district court case, Patent Owner Metaswitch identifies the function as “routing data between said network interfaces and said line/trunk interface” and the corresponding structure as “PCM interface and/or line/trunk manager module and equivalents thereof.” Metaswitch identifies the PCM interface as comprising line/trunk frame interfaces 201, DS1 interfaces 202, and timeslot interchange function 203. It is my opinion that the extent of any structure disclosed in the ’018 Patent for the timeslot interchange 303 appears at 5:27-46, 6:11-32; FIGS. 2, 3.

45. *Means for converting data (Claims 1 and 7).* I understand that in the related district court case, Patent Owner Metaswitch identifies the function as “means for converting data between time-division multiplexed digital signals [of a legacy line frame of a legacy line] and packetized digital signals” and the corresponding structure as “format converter and equivalents thereof.” It is my opinion that the extent of any structure disclosed in the ’018 Patent for the format converter 312 appears at 5:47-6:43; FIG. 3.

## **VI. SUMMARY OF PRIOR ART**

46. As shown by the evolution of telephony networks prior to the filing of the ’018 Patent, it is my opinion that the subject matter of the ’018 Patent was not novel at the time. A switching system interface for bypassing the common control and switch matrix of a Class 5 digital switch and converting TDM digital signals to

packetized digital signals was known in the art. As discussed below, the *Smith Publication* discloses a switching system interface for bypassing the common control and switch matrix of a Class 5 digital switch. The switching system interface includes at least two different network interfaces, each of which are capable of connecting to a packet network architecture. As one example, the switching system interface includes a DSP that converts TDM digital signals to packetized digital signals. Thus, the output of the DSP is connected to a packet network architecture. As another example, the switching system interface also includes a network interface for connecting to an external media gateway (local terminal 301), and the external media gateway converts TDM digital signals to packetized digital signals.

47. Furthermore, converting between TDM digital signals and packetized digital signals was generally known in the art at the time. U.S. Patent No. 6,064,673 (“*Anderson*”) provides an example that, as I understand, the Examiner used to reject converting between TDM and packet as a reason for patentability during the original prosecution of the ‘018 Patent. Ex. 1004 at pp. 80-83, citing Ex. 1006 at 2:12-29 and 5:65-6:10. As further discussed below, it is my opinion that the *Smith Publication* anticipates or, in view of *Anderson*, renders obvious each of the challenged claims of the ‘018 Patent.

**A. *Smith Publication***

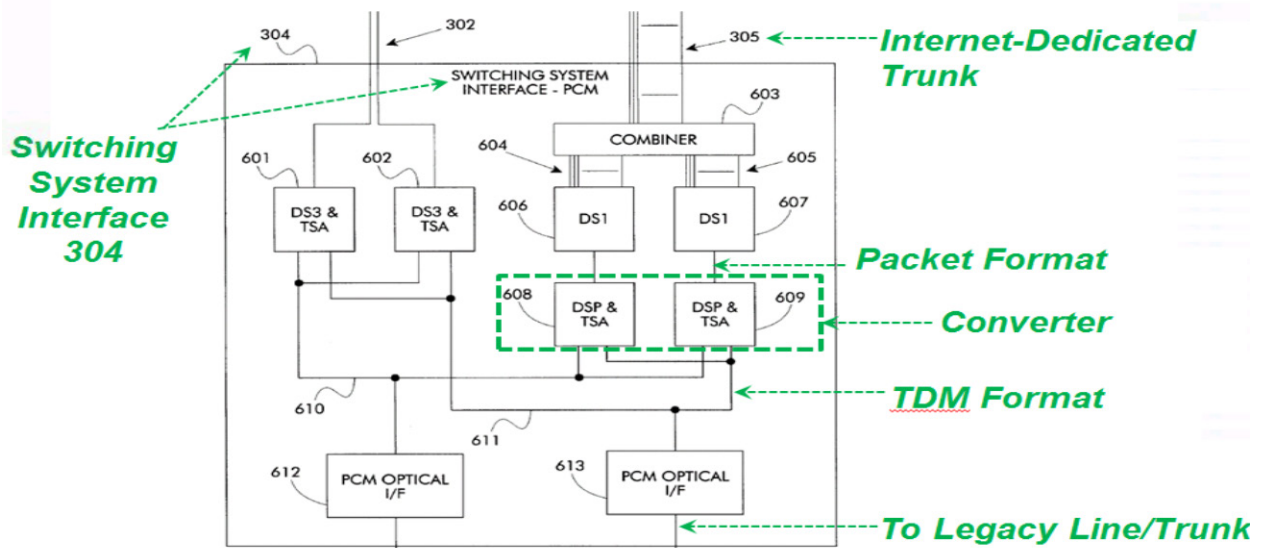
48. I have reviewed and considered the *Smith Publication*. As discussed in more detail below, it is my opinion that the *Smith Publication* discloses or at least renders obvious all of the limitations of the challenged claims of the '018 Patent. In particular, it is my opinion that the *Smith Publication* discloses both (i) bypassing the common control and switch matrix of a Class 5 digital switch and (ii) converting TDM digital signals to packetized digital signals.

49. The *Smith Publication* discloses bypassing the common control and switch matrix of a Class 5 digital switch. The *Smith Publication* is the publication of the application for the '273 Patent, on which the '018 Patent relies to support the “bypass” feature. Based on my inspection, except for differences in the claims, the *Smith Publication* is identical to the '273 Patent summarized above.

50. The *Smith Publication* also discloses converting TDM digital signals to packetized digital signals. For example, the background of the *Smith Publication* discloses that known media gateways “convert the digital format of voice calls on trunks from legacy class 5 switches into the formats used in packet networks.” Ex. 1005, ¶ 008. In addition, the *Smith Publication* discloses combining TDM-to-packet conversion with a switching system interface for bypassing the common control and switch matrix of a Class 5 switch.

51. For example, the *Smith Publication* discloses that the switching

system interface 304 includes an internet reroute feature that intercepts and diverts internet traffic. *Id.*, ¶ 049, 057. The internet reroute feature functions like a digital modem that converts a subscriber's dial-up analog modem signals into packets, such as ATM cells or Ethernet, and then routes these packets to the internet. Specifically, Figure 6 of the *Smith Publication* (annotated below) illustrates that switching system interface 304 includes DSP modules 608 and 609 that convert time-division multiplexed digital signals received from a legacy line via PCM buses 610 and 611 to packetized digital signals. *See Id.*, ¶ 057. DSP module 608 comprises DSP section 912 which uses “conventional” algorithms to convert between time-division multiplexed (TDM) and packetized digital signals. *Id.* at FIGS. 3, 6, 9 and ¶ 0071 (“conventional modem signal processing algorithms may be programmed into DSP section 912 for converting the analog modem tones represented in one or more PCM timeslots into digital packets”).



**Ex. 1005 (*Smith Publication*) at Figure 6 (annotated)**

52. Thus, *Smith Publication* discloses both a standalone media gateway for converting circuit switched calls to packet calls, as well as a particular gateway (i.e., internet reroute feature) integrated with the switching system interface for converting time division multiplexed signals to packets.

53. Accordingly, both (i) bypassing the common control and switch matrix of a Class 5 digital switch, and (ii) converting the digital format of voice calls from legacy Class 5 switches into the formats used in packet networks were disclosed in the prior art *Smith Publication*. It is my opinion that the challenged claims are anticipated or at least obvious in view of the *Smith Publication*.

## **B. *Anderson***

54. I have reviewed and considered U.S. Patent No. 6,064,673 ("*Anderson*"). It is my opinion that *Anderson* discloses converting TDM digital



signals to packetized digital signals using PCM data transport, as recited in Claim 1 of the '018 Patent.

55. For example, *Anderson* discloses well-known systems for sending packetized audio over the Internet, such as accessories that interface with a Private Branch Exchange (PBX) to convert a time-division multiplexed digital signal to a packet-based digital signal. Ex. 1006, 2:12-20. A particular advantage disclosed in *Anderson* is providing quality of service (QoS) (minimizing packet loss and latency) for voice applications over the Internet. *Id.*, 2:26-29.

56. The system disclosed in *Anderson* includes a CPU, an analog telephone line interface module (TLIM), an Ethernet hub, and telephones. *Id.*, 4:27-31. The CPU supports call control management and TCP/IP processing, such as IP Gateway and Computer Telephone Integration (CTI). *Id.*, 4:37-43. The TLIM connects to a central office (such as a Class 5 central office) of a telephone service provider via the public switched telephone network (PSTN). *Id.*, 4:49-51. The telephones are connected to the network by Ethernet hub 18. *Id.*, 4:53-54. *Anderson* discloses that these components can be modules that plug into a motherboard in a housing. *Id.*, 4:31-33.

57. *Anderson* also discloses a protocol stack for placing telephone calls that includes an application layer, an audio packetization layer, an audio depacketization layer, a call control layer, an Ethernet layer, and a hardware

abstraction layer (HAL). *Id.*, 5:26-30. The packetization layer builds data packets from an audio stream using standard compression techniques such as pulse code modulation (PCM), and the depacketization layer performs the reverse operation. *Id.*, 5:66-6:8.

58. Thus, it is my opinion that *Anderson* discloses converting TDM digital signals to packetized digitals using PCM data transport. Furthermore, the components disclosed in *Anderson* can plug into a motherboard in a housing, and thus one of ordinary skill in the art would understand that the components for converting TDM digital signals to packetized digitals could plug into a motherboard or chassis such as switching system interface 304 disclosed in the *Smith Publication*.

**VII. Claims 7, 8, 10, 13, and 14 are unpatentable as anticipated under § 102 in view of the Smith Publication**

59. In my opinion, the *Smith Publication* discloses all of the limitations of claims 7, 8, 10, 13, and 14, and thus claims 7, 8, 10, 13, and 14 are unpatentable as anticipated by the *Smith Publication*.

**1. Independent Claim 7**

60. As discussed below, in my opinion, the *Smith Publication* discloses each limitation of Claim 7, including bypassing the common control and switch matrix of a class five switch, which the Examiner deemed as “critical” and which the Applicant added to the claims to gain allowance.

***Switching system interface (claim limitations [7a]-7[b])***

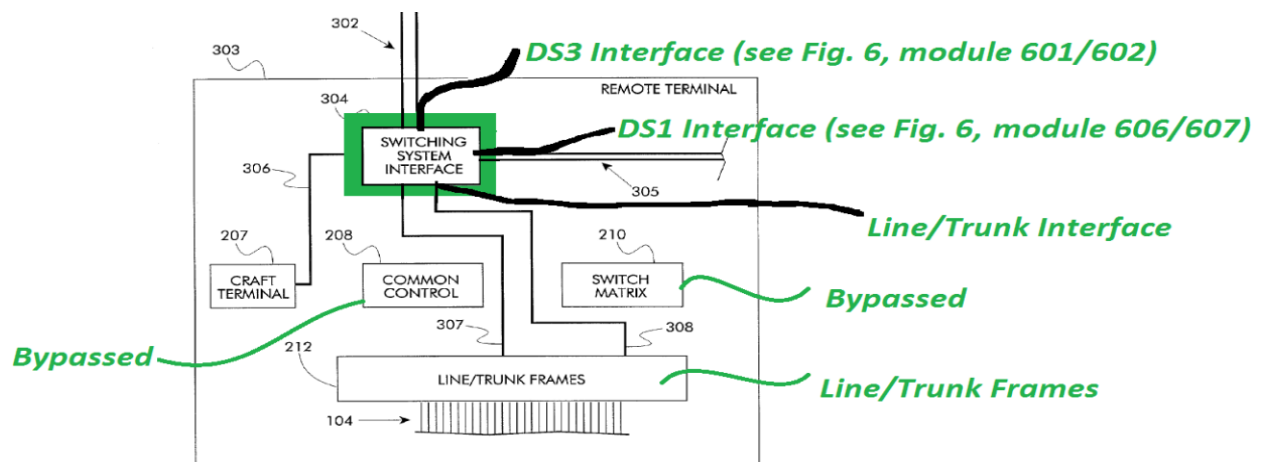
61. It is my opinion that the *Smith Publication* discloses a switching system interface used to bypass a common control and switch matrix of a class 5 digital switch. In the '018 Patent, support for bypassing the common control and switch matrix comes from incorporation by reference of the '273 Patent. The background section of the '018 Patent admits that the '273 Patent discloses such bypassing. Ex. 1001 at 1:9-20 and 1:45-51. I understand that during prosecution, the Examiner issued a double patenting rejection over the '273 Patent. Ex. 1004, pp. 56-58. I understand that this equates to the Examiner rejecting the '018 Patent claims as obvious over the '273 Patent had the Examiner uncovered the break in priority.

62. The *Smith Publication* is a prior publication of the application that led to the '273 Patent. As shown in the analysis and claim chart below, the *Smith Publication* discloses a switching system interface 304 for bypassing the common control and switch matrix and converting TDM signals to packets.

***means for bypassing a common control and switch matrix of a class 5 digital switch (claim limitation [7c])***

63. I understand that in the related district court litigation, the Patent Owner identifies line/trunk interfaces, DS1 interfaces, and equivalents thereof as the means for bypassing the common control and switch matrix. It is my opinion that the *Smith Publication* discloses a switching system interface 304 with

equivalent structure to line/trunk interfaces (e.g., PCM Optical I/F 612/613 discussed with respect to limitation [7e] below) and DS1 interfaces (e.g., any of modules 601, 602, 606, or 607 discussed with respect to limitation [7d] below). FIG. 3 of the *Smith Publication* has been annotated below to show these interfaces and the bypassed common control and switch matrix:



**Ex. 1005 (*Smith Publication*) at Figure 3 (annotated excerpt)**

***network interface for terminating a digital transmission facility that is part of a packet-network architecture (claim limitation [7d])***

64. It is my opinion that any one of modules 601, 602, 606, or 607 in the *Smith Publication* discloses a network interface that terminates a digital transmission facility. *Smith Publication*’s FIG. 6 shows DS3 modules 601/602 terminate digital transmission facility 302. FIG. 6 shows DS1 modules 606/607 terminate digital transmission facility 305. It is my opinion that either of these digital transmission facilities 302/305 is part of a “packet-network architecture.”

65. It is my opinion that digital transmission facility 302 is part of a

packet-network architecture. FIG. 3 shows that digital transmission facility 302 connects to a local terminal 301. Ex. 1005, FIG. 3. The *Smith Publication* states that local terminal 301 can be a media gateway and that a media gateway is a packet switch. Ex. 1005, ¶¶ 008 and 046. Thus, digital transmission facility 302 is part of a packet-network architecture because it connects to a packet-based device.

66. It is my opinion that digital transmission facility 305 is also part of a packet network architecture. The *Smith Publication* discloses that digital transmission facility 305 carries ATM packets that DS3 modules 601/602 receive from DSP modules 608, 609. *See e.g.*, Ex. 1005, ¶¶ 008, 056-057, FIG. 3 and FIG. 6.

***line/trunk interface, compatible with internal signals used to operate the line/trunk interface of the class 5 switch (claim limitation [7e])***

67. It is my opinion that the *Smith Publication* discloses the line/trunk interface recited in Claim 7 of the '018 Patent. For example, *Smith Publication's* FIG. 3 shows that switching system interface 304 interfaces with line/trunk frames 212. FIGS. 6-7 show components of switching system interface 304, including PCM Optical I/F 612/613 for interfacing with line/trunk frames. *See e.g.*, Ex. 1005, ¶ 54. It is my opinion that at least PCM Optical I/F 612/613 is a line/trunk interface. For example, PCM Optical I/F 612/613 couples between cables 505/510 and PCM bus 610/611. Cables 505/510 allow for connection to the line/trunk frames. *Id.*, ¶ 55 (e.g., cables 505/510 are installed so that line/trunk frames 212

can be changed over to the switching system interface 304). PCM Optical I/F 612/613 associates each line/trunk frame circuit with a time slot assigned on PCM bus 610/611. *Id.*, ¶ 54.

68. It is my opinion that the *Smith Publication's* line/trunk interface is compatible with “internal signals” used to operate line/trunk frames. For example, the *Smith Publication* discloses compatibility with “proprietary signals of a digital switching system that communicate between the line/trunk frames and the common-control-and-switch matrix.” *Id.* ¶ 023. Figure 2 illustrates the line/trunk frames 212, common control 208, and switch matrix 210 as internal to switch plant 205 (i.e., the class 5 switch). Ex. 1005, ¶ 041 (switch plant 205 shows the components of the class 5 switch).

69. Figure 4, with reference to Figure 2, illustrates connecting switching system interface 304 to “internal wiring” (cables 209 and 213) previously used by the common control and switch matrix. *Id.* at ¶ 047 (“In order to access internal wiring, one or more specialized circuit modules 405 and 406 are installed. ... Thus, switching system interface 304 accesses [] all necessary busses and signals in order to manage line/trunk frames 212 ... while the potentially complex and/or old and fragile cabling associated with the various groups of equipment frames from the prior art class 5 switching system have been left intact and not disturbed.”).

70. I understand that the ‘273 Patent that issued from the application that

published as the *Smith Publication* includes claims that recite “internal signals.” Ex. 1003, claims 1, 2, 6, 8, 13, 16, 18, 24, 26. I understand that the Examiner did not raise a written description objection when the ‘273 Patent application was amended to recite “internal signals” in the claims; thus, the Examiner determined that the application that published as the *Smith Publication* discloses internal signals.

***switching means for routing data between the network interface and the line/trunk interface (claim limitation [7f])***

71. I understand that in the related district court litigation, the Patent Owner identifies the structure of the switching means as DS1 interfaces 202, line/trunk frame interfaces 201, and timeslot interchange function 203 of the ‘018 Patent. For the reasons discussed above regarding limitations [7d] and [7e], the *Smith Publication* discloses equivalent structure to DS1 interfaces 202 (e.g., any of DS3 modules 601/602 and/or DS1 modules 606/607 are equivalent) and line/trunk frame interfaces 201 (e.g., PCM Optical I/F 612/613).

72. It is my opinion that the *Smith Publication* also discloses time slot assignment means (TSA) equivalent to timeslot interchange function 203 of the ‘018 Patent. The *Smith Publication* discloses several TSAs (e.g., TSA 601, 602, 608, 609, 809, 913, and 914). Any of these TSAs is equivalent to the timeslot interchange of the ‘018 Patent.

73. For example, FIG. 6 of the *Smith Publication* shows TSA 601/602

routes data between a network interface (DS3 601/602) and the line trunk interface (PCM optical I/F 612/613). Figure 8 of *Smith Publication* illustrates the components of DS3 601/602. Figure 8 illustrates that DS3 601 comprises both a DS3 Line Interface Unit (LIU) 802 and a timeslot assignment (TSA) means 809. TSA 809 maps selected timeslots between the PCM streams 805 (coming from LIU 802) and PCM busses 610/611 (which, as explained above, are couple to the line/trunk frames). *Id.*, ¶¶ 060-62. Thus, it is my opinion that at least TSA 809 is equivalent structure for routing data between the network interface and the line/trunk interface.

74. It is my opinion that TSA 608/609 shown in FIG. 6 also routes data between a network interface (DS1 606/607, discussed above) and line trunk interface (PCM optical I/F 612/613 to line/trunk frames 212, discussed above). Figure 9 of the *Smith Publication* illustrates additional detail, where modules 608/609 comprise TSA 913/914 that receive timeslots from line/trunk frames and provide the timeslots to DSP section 912 for conversion to packets and transmission to the network interface.

***means for converting data between time-division multiplexed digital signals and packetized digital signals (claim limitation [7g])***

75. It is my understanding that the Examiner rejected, in view of *Anderson*, converting between TDM and packet as a reason for patentability during prosecution of the '018 Patent. Ex. 1004, pp. 80-83. Additionally, the '018 Patent



admits that converting between TDM and packet was known. Ex. 1001, 2:8-11 (“media gateways ... are specialized packet switches that also convert the time-division multiplexed digital format of voice calls on trunks from legacy class 5 switches into the packetized formats used in packet networks.”).

76. I agree with the ‘018 Patent that converting between TDM and packet was known prior to the earliest possible priority date of the ‘018 Patent. It is my recollection that in the mid to late 1990s, companies such as Sonus, Convergent Networks, and Tachion provided media gateways having circuit-to-packet capabilities, and vendors such as Netscape, Intel, and Microsoft were all launching VoIP products. By 1999, various standards bodies published standards for VoIP communications and for protocols used in circuit-to-packet gateways, such as H.323 (an ITU-T packet-telephony protocol suite), session-initiation protocol (SIP), Microsoft’s NetMeeting, Internet-protocol device control (IPDC), and media-gateway control protocol (MGCP)/MeGaCO (H.248).

77. The *Smith Publication* demonstrates that combining a switching system interface for bypassing the common control and switch matrix with TDM/packet conversion was also known. For example, switching system interface 304 includes DSP modules 608 and 609 that receive TDM timeslots from legacy lines via PCM buses 610 and 611. Ex. 1005, Fig. 6; ¶¶ 054, 057. The DSP modules 608 and 609 include a DSP section 912 that converts the received digital

signals to packetized digital signals. *Id.* ¶ 057; FIG. 9; ¶ 071 (“conventional modem signal processing algorithms may be programmed into DSP section 912 for **converting** the analog modem tones represented in one or more **PCM timeslots into digital packets**, and vice versa”). It is my opinion that one of ordinary skill in the art would understand the disclosure of timeslots to refer to time division multiplexed signals. Time division multiplexing allows signals from multiple lines/trunks to interface with a shared resource, such as a shared PCM bus 610 or 611. The signals from each line/trunk are allocated into timeslots to facilitate sharing the resource (e.g., signal A uses the shared resource during timeslot A and signal B uses the shared resource during timeslot B).

78. It is my understanding that in the related district court litigation, the Patent Owner identifies the corresponding structure as format converter 312 in the ‘018 Patent. The ‘018 Patent illustrates format converter 312 as a black box, and describes that it can be a “DSP” that converts between TDM and packets. Ex. 1001, 5:59-63. It is my opinion that the *Smith Publication’s* “DSP” modules 608/609 disclose the same or equivalent structure.

79. Thus, it is my opinion that the *Smith Publication* teaches the “converting data between time-division multiplexed digital signals and packetized digital signals” as recited in Claim 7 of the ‘018 Patent.

80. Claim 7 of the ‘018 Patent includes three means-plus-function

elements, a means for bypassing, a switching means, and a means for converting. As discussed above, it is my opinion that the *Smith Publication* discloses equivalent structure for the means-plus-functions elements of Claim 7. For many of the elements, because the ‘018 Patent incorporates the ‘273 Patent by reference, the *Smith Publication* discloses the *identical* structure as disclosed in the ‘018 Patent. The equivalent structure is identified in the claim chart below.

‘018 Patent Claims	<i>Smith Publication (“Smith”)</i>
[7a] A switching system interface providing conversion between time-division multiplexed digital signals and packetized digital signals used to bypass a common control and switch matrix of a class 5 digital switch, the switching system interface comprising:	<p><i>See e.g., Smith at ¶ 012, “What is needed is <b>a means to bypass the common control and switch matrix of a legacy class 5 switching system</b> in a way that permits any other switching system or media gateway to perform the associated functions, so that the legacy software may be discarded and/or any limitations of the legacy switch matrix may be overcome, <b>while retaining the legacy line/trunk frames and cable plant and incurring minimal changes to the overall physical plant of the legacy class 5 central office.</b>”</i></p> <p><i>See e.g., Smith at ¶ 015, “Therefore, what is needed is a method of <b>bypassing the common control and switch matrix of a first class 5 digital switch, by providing a switching system interface which couples one or more line/trunk frames of the first digital switch to one or more digital transmission facilities</b> that make up the remote end of a DLC, where the local terminal is a second class 5 digital switch or media gateway.”</i></p> <p><i>See e.g., Smith at ¶¶ 045-046, “One embodiment of the method of the present invention is illustrated schematically in FIG. 3. ... A local terminal 301, typically comprising a class 5 digital switch or media gateway, resides either in another office (possibly in another city), or even in the same office, and couples to switching system interface 304 by means of one or more digital transmission facilities 302. <b>Remote terminal 303 of the DLC architecture comprises</b></i></p>

line/trunk frames 212 and switching system interface 304. Optional internet-dedicated trunks 305 carry intercepted internet traffic that is diverted away from local terminal 301.”

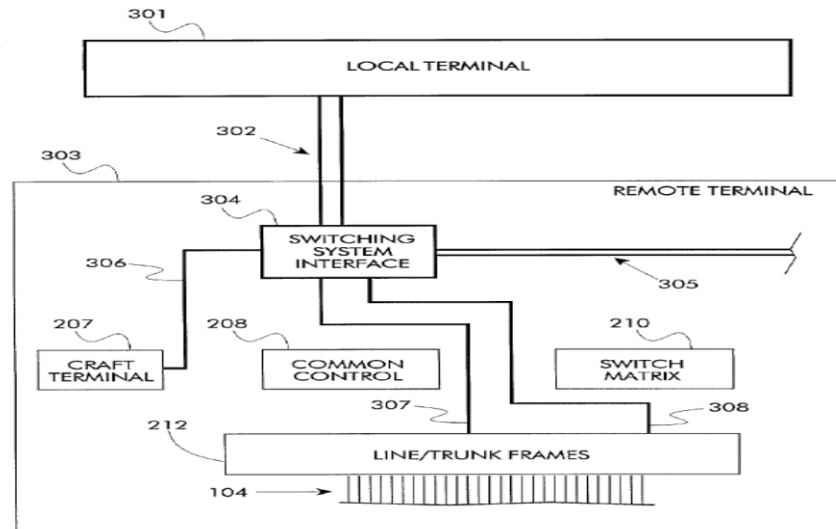


Fig. 3

See e.g., *Smith* at ¶ 008, “Another trend is toward networks that carry both voice calls and data over common transport based on connectionless access protocols such as asynchronous transfer mode (“ATM”) and transport control protocol/ *internet protocol* (“TCP/IP”), *also referred to as ‘packet networks.’* ... ‘Media gateways’ are packet switches that also *convert the digital format of voice calls on trunks from legacy class 5 switches into the formats used in packet networks.*”

See e.g., *Smith* at ¶ 030, “**FIG. 6 illustrates the component modules of a preferred embodiment of the switching system interface** of the present invention, that process and route pulse-code modulation signals.”

See e.g., *Smith* at ¶ 057, “**Redundant digital signal processor (“DSP”) modules 608 and 609 provide the internet reroute capability** mentioned above. ... It will be further seen by one skilled in the art that DSP modules 608 and 609 can be made capable of performing the functions of dial-up digital modems, and that DS1 modules 606 and 607 would then carry packets such as ATM cells instead of

	<p>circuits, or could be replaced with industry standard digital packet interfaces such as 100BaseT.”</p> <p><i>See e.g., Smith</i> at ¶ 033, “FIG. 9 illustrates schematically the component parts of a ... DSP module that are used to identify dial-up internet calls.”</p> <p><i>See e.g., Smith</i> at ¶ 068, “<b>DSP module 608 comprises</b> data memory 907, CPU section 909, redundant management interfaces 910 and 911, <b>DSP section 912</b>, and redundant time slot assignment means 913 and 914.”</p> <p><i>See e.g., Smith</i> at ¶ 071, “It will also be understood by one skilled in the art that <b><i>conventional modem signal processing algorithms may be programmed into DSP section 912 for converting the analog modem tones represented in one or more PCM timeslots into digital packets</i></b>, and vice versa.”</p> <p><i>See also</i> ¶¶ 002-004, 012,015, ‘018, 019, 023, 024, 032, 041, 045, 047, 072, FIGS. 1-9, Abstract, Claim 1, Claim 5.</p>	
<b>‘018 Patent Claims</b>	<b><i>Smith Publication (“Smith”)</i></b>	
[7b] a switching system interface	<p><i>See e.g.,</i> FIGS. 3, 6, “<b><i>switching system interface 304</i></b>”</p> <p><i>See e.g.,</i> claim limitation [7a] <i>supra</i>.</p>	
<b>‘018 Patent Claims</b>	<b>‘018 Patent § 112(6)</b>	<b><i>Smith</i></b>
[7c] having means for bypassing a common control and switch matrix of a class 5 digital switch,	<p>Structure:</p> <p>line/trunk interfaces, DS1 interfaces, and equivalents thereof.</p>	<p><i>See e.g., Smith</i> at FIG. 3 and ¶ 045, “One embodiment of the method of the present invention is illustrated schematically in FIG. 3. In this method the stored program control system 208 and switch matrix 210 of FIG. 2 are disconnected and replaced by switching system interface 304. ... PCM cables 213 are replaced by <b><i>PCM cables 308, which carry PCM between line/trunk frames 212 and switching system interface 304.</i></b>”</p> <p><i>See e.g., Smith</i> at FIG. 3 and ¶ 046, “<b><i>A local terminal 301... couples to switching system interface 304 by means of one or more digital transmission facilities 302.</i></b>”</p>

		<p>See e.g., <i>Smith</i> at FIG. 6 and ¶ 053, “FIG. 6 illustrates schematically the internal PCM flow of a version of the preferred embodiment of the switching system interface of the present invention. <b><i>This version uses DS3’s as digital transmission facilities to the local terminal, and DS1’s as dedicated internet trunks.</i></b>” See also, <i>Smith</i> at FIG. 8 and ¶¶ 060-065.</p> <p>See e.g., <i>Smith</i> at ¶ 015, “bypassing the common control and switch matrix of a first class 5 digital switch, by providing a switching system interface which <b><i>couples one or more line/trunk frames of the first digital switch to one or more digital transmission facilities.</i></b>”</p> <p>See e.g., <i>Smith</i> at ¶ 052, “The technician now commands line/trunk frames 212 to change operation over to B-plane, which causes service to be carried through switching system interface 304 and thus through local terminal 301. ... <b><i>[The technician] installs the corresponding specialized circuit modules 502 and 504</i></b> comprising A-plane 501, and installs cable sets 503 and 508. Now redundancy is available through switching system interface 304, and <b><i>the common control and switch matrix of prior art class 5 switching system 102 have been completely bypassed.</i></b>”</p> <p>See e.g., <i>Smith</i> at ¶ 045, “PCM cables 213 are replaced by <b><i>PCM cables 308,</i></b></p>
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		<p><i>which carry PCM between line/trunk frames 212 and switching system interface 304.</i> A subset of management cables 209 used for managing line/trunk frames 212 are replaced by <i>management cables 307, which carry management signals between the line/trunk frames and the switching system interface[.]</i>”</p> <p><i>See e.g., Smith at ¶ 047, “internal wiring associated with administrative cables 209 and PCM cables 213 [of the prior art class 5 switching system] are still in place. In order to <b>access this internal wiring</b>, one or more specialized circuit modules 405 and 406 are installed in depopulated frames 403 and 404, in place of the removed prior art modules. Cable sets 401 and 402 connect specialized circuit modules 405 and 406 to switching system interface 304. Thus, <b>switching system interface 304 accesses [] all necessary busses and signals in order to manage line/trunk frames 212 and carry PCM data to and from these frames, while the potentially complex and/or old and fragile cabling associated with the various groups of equipment frames from the prior art class 5 switching system have been left intact and not disturbed.</b>”</i></p> <p><i>See e.g., limitations [7a]-[7b] supra.</i></p>
	<p>Function:</p> <p>“bypassing a common control and switch</p>	<p><i>See e.g., Smith at ¶ 052, “The technician now commands line/trunk frames 212 to change operation over to B-plane, which causes service to</i></p>

	matrix of a class 5 digital switch”	<p>be carried through switching system interface 304 and thus through local terminal 301. ... [The technician] installs the corresponding specialized circuit modules 502 and 504 comprising A-plane 501, and installs cable sets 503 and 508. Now redundancy is available through switching system interface 304, and <b><i>the common control and switch matrix of prior art class 5 switching system 102 have been completely bypassed.</i></b>”</p> <p>See e.g., <i>Smith</i> at claim 8. A <b><i>switching system interface for <u>bypassing the common-control-and-switch matrix</u> of a first digital switching system</i></b> for telecommunications networks, <b><i>comprising: at least one network interface for terminating a digital transmission facility</i></b> that is part of a digital loop carrier architecture, <b><i>at least one line/trunk pulse-code modulation interface</i></b>, compatible with the pulse-code modulation signals used to operate said line/trunk frames of said first digital switching system, [and] a time-slot assignment means, connected to said network interfaces and to said line/trunk pulse-code modulation interfaces, for <b><i>coupling certain pulse-code modulation timeslots between said network interfaces and said line/trunk pulse-code modulation interfaces</i></b>[.]</p> <p>See e.g., limitations [7a]-[7b] <i>supra</i>.</p>
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'018 Patent Claims	Smith Publication ("Smith")
<p>[7d] at least one network interface for terminating a digital transmission facility that is part of a packet-network architecture;</p>	<p>See e.g., <i>Smith</i> at Abstract "A switching system interface comprising <b><i>one or more network interfaces for terminating digital transmission facilities</i></b>[.]"</p> <p>See e.g., <i>Smith</i> at ¶ 023, "a switching system interface comprising ... <b><i>at least one network interface connected to the remote end of a corresponding digital transmission facility of a DLC architecture.</i></b>"</p> <p>See e.g., <i>Smith</i> at ¶ 030, "<b><i>FIG. 6 illustrates the component modules of a preferred embodiment of the switching system interface [304]</i></b> of the present invention, that process and route pulse-code modulation signals."</p> <div data-bbox="560 751 1385 1304" data-label="Diagram"> </div> <p style="text-align: center;">Fig. 6</p> <p>See e.g., <i>Smith</i> at ¶ 055, "<b><i>digital transmission facilities 302 of FIG. 3 comprise redundant DS3 facilities terminating on A-plane DS3 module 601 and B-plane DS3 module 602</i></b> [of switching system interface 304]."</p> <p>See e.g., <i>Smith</i> at ¶ 032 "FIG. 8 illustrates schematically a preferred embodiment of a network interface [.]"</p> <p>See e.g., <i>Smith</i> at ¶¶ 060-062, "FIG. 8 illustrates schematically [that] this embodiment of the electronic module that can perform as either DS3 module 601 and DS3 module 602."</p>

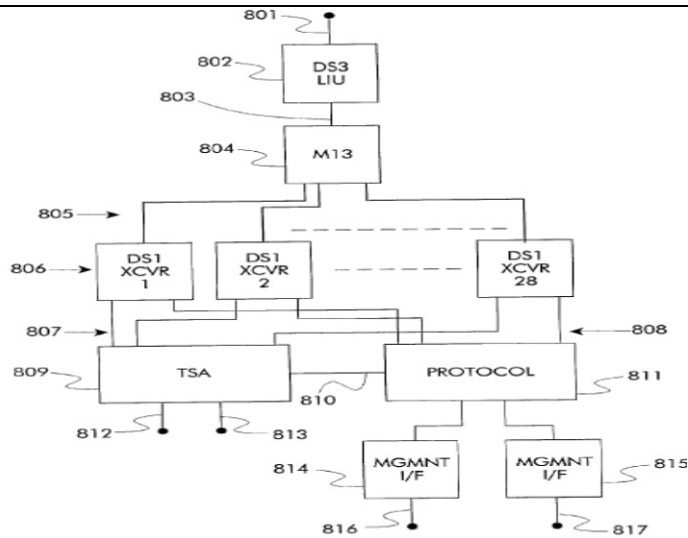


Fig. 8

See e.g., *Smith* at ¶¶ 060-062, “The processing of the DS3 signal is conventional, as follows: DS3 facility 801 is coupled to DS3 line interface unit 802, which terminates the DS3 line signal, extracts clock and data, and monitors for line quality. The clock and data are coupled in turn to M13 multiplexer 804, Which terminates the DS3 framing patterns, translates the DS3 data into 28 DS1 signals and monitors for DS3 problems. The 28 DS1s 805 are coupled to 28 DS1 transceivers 806, Which terminate the DS1 framing pattern for each DS1, extract clock and data, and monitor for DS1 problems. The 28 PCM streams 807 from DS1 transceivers 806 are coupled to time slot assignment means 809, which is programmed to map selected timeslots between the PCM streams and redundant PCM busses 610 and 611.”

See e.g., *Smith* at ¶ 046, “***A local terminal 301, typically comprising a class 5 digital switch or media gateway,*** resides either in another office (possibly in another city), or even in the same office, and ***couples to switching system interface 304 by means of one or more digital transmission facilities 302.***”

See e.g., *Smith* at ¶ 008, “Another trend is toward networks that carry both voice calls and data over common transport based on connectionless access protocols such as asynchronous transfer mode (“ATM”) and transport control

	<p>protocol/internet protocol (“TCP/IP”), also referred to as “packet networks”. ... <b><i>“Media gateways” are packet switches that also convert the digital format of voice calls on trunks from legacy class 5 switches into the formats used in packet networks.</i></b></p> <p><i>See e.g., Smith at ¶¶ 056-057, “digital transmission facilities 305 of FIG. 3 comprise one or more DS1 facilities terminating on A-plane DS1 module 606 and B-plane DS1 module 607. ... DSP modules 608 and 609 can be made capable of performing the functions of dial-up digital modems, and that <b>DS1 modules 606 and 607 would then carry packets</b> such as ATM cells instead of circuits, or could be replaced with industry standard digital packet interfaces such as 100BaseT.”</i></p> <p><i>See also ¶¶ 003-004, 012, 015, 019, 035-045, 053, 055, 060-065, Claims 8-9, FIGS. 2, 3-9.</i></p> <p><i>See e.g., claim limitations [7a]-[7c] supra.</i></p>
<b>‘018 Patent Claims</b>	<b><i>Smith Publication (“Smith”)</i></b>
<p><b>[7e]</b> at least one line/trunk interface, compatible with internal signals used to operate the line/trunk interface of the class 5 digital switching system; and</p>	<p><i>See e.g., Smith at Claim 8, “A switching system interface ... comprising ... <b>at least one line/trunk pulse-code modulation interface, compatible with the pulse-code modulation signals used to operate said line/trunk frames of said first digital switching system</b> [.]”</i></p> <p><i>See e.g., Smith at Claim 23, “method comprises <b>accessing the proprietary signals of a digital switching system</b> that communicate between the line/trunk frames and the common-control-and-switch matrix; <b>providing a switching system interface comprising interfaces compatible with the proprietary signals</b>[.]”</i></p> <p><i>See e.g., Smith at ¶ 045, “PCM cables 213 are replaced by <b>PCM cables 308, which carry PCM between line/trunk frames 212 and switching system interface 304</b>. A subset of management cables 209 used for managing line/trunk frames 212 are replaced by <b>management cables 307, which carry management signals between the line/trunk frames and the switching system interface</b>[.]”</i></p> <p><i>See e.g., Smith at ¶ 047, “internal wiring associated with</i></p>

	<p>administrative cables 209 and PCM cables 213 [of the prior art class 5 switching system] are still in place. In order to <b><i>access this internal wiring</i></b>, one or more specialized circuit modules 405 and 406 are installed in depopulated frames 403 and 404, in place of the removed prior art modules. Cable sets 401 and 402 connect specialized circuit modules 405 and 406 to switching system interface 304. Thus, <b><i>switching system interface 304 accesses [] all necessary busses and signals in order to manage line/trunk frames 212 and carry PCM data to and from these frames, while the potentially complex and/or old and fragile cabling associated with the various groups of equipment frames from the prior art class 5 switching system have been left intact and not disturbed.</i></b></p> <p><i>See e.g., Smith at ¶ 059 “redundant shelf controls 701 and 702 control all line trunk frames[.]”</i></p> <p><i>See also Smith at ¶¶ 023, 047, 053, FIGS. 2-9, Claim 8.</i></p> <p><i>See e.g., claim limitations [7a]-[7d] supra.</i></p>	
<b>‘018 Patent Claims</b>	<b>‘018 Patent § 112(6)</b>	<b><i>Smith</i></b>
[7f] a switching means, connected to the network interface and to the line/trunk interface, for routing data between the network interfaces and the line/trunk interface; and	Structure:  PCM interface, line/trunk manager module, and/or timeslot interchange and equivalents thereof	<p><i>See e.g., Smith at FIG. 6 “PCM optical interface 612” and “PCM optical interface 613.” See also Smith at ¶ 054.</i></p> <p><i>See e.g., Smith at FIG. 7, “line/trunk manager 705” and “line/trunk manager 706.” See also Smith at ¶ 059.</i></p> <p><i>See e.g., Smith at ¶¶ 060-064, “line interface unit 802 [] terminates the DS3 line signal[.] ... M13 multiplexer 804 ... translates the DS3 data into 28 DS1 signals[.] ... The 28 PCM streams 807 from <b><i>DS1 transceivers 806 are coupled to time slot assignment means 809, which is programmed to map selected timeslots between the PCM streams and redundant PCM busses 610 and</i></b></i></p>

		<p><b>611. ...”</b></p> <p><i>See e.g., Smith at ¶ 054, “each circuit of the associated line/trunk frames has a time slot assigned in the upstream and the downstream directions of PCM busses 610 and 611.”</i></p> <p><i>See e.g., Smith at Claim 9, “[a] call processing means causes certain pulse-code modulation timeslots to be connected between said network interfaces and said line/trunk frames, by operating said individual time-slot assignment means on said network interfaces.”</i></p> <p><i>See e.g., Smith at Claim 8, FIGS. 6, 8, 9, “TSA” [time slot assignment]. See also Smith at ¶¶ 045, 053-054, 062.</i></p> <p><i>See e.g., claim limitations [7a]-[7e] supra.</i></p>
	<p>Function:</p> <p>“routing data between said network interfaces and said line/trunk interface”</p>	<p><i>See e.g., Smith at Claim 1, “A method for bypassing the common-control-and-switch matrix of a first digital switching ... providing a <b>switching system interface comprising at least one network interface</b> ... and comprising interfaces compatible with said pulse-code modulation, timing, and management signals, <b>and connecting said compatible interfaces of said switching system interface to said line/trunk frame of said first digital switching system.</b>”</i></p> <p><i>See e.g., Smith at ¶ 030, “FIG. 6 illustrates the component modules of a preferred embodiment of the <b>switching system interface of the</b></i></p>

		<p><i>present invention, that process and <u>route</u> pulse-code modulation signals.”</i></p> <p><i>See also ¶¶ 015, 019, 023, 024, 030, 045, 047, 053-059, 062, FIG. 3-9, Claims 8-9.</i></p> <p><i>See e.g., claim limitations [7a]-[7e] supra.</i></p>
<b>‘018 Patent Claims</b>	<b>‘018 Patent § 112(6)</b>	<b><i>Smith</i></b>
<p>[7g] means for converting data between time-division multiplexed digital signals and packetized digital signals.</p>	<p>Structure:</p> <p>format converter and equivalents thereof</p>	<p><i>See e.g., Smith at FIG. 6, “DSP 608” and “DSP 609.”</i></p> <p><i>See e.g., Smith at FIG. 6 and ¶ 057, “<b><i>Redundant digital signal processor (“DSP”) modules 608 and 609 provide the <u>internet reroute</u> capability</i> mentioned above.”</b></i></p> <p><i>See e.g., Smith at ¶ 054, “<b><i>each circuit of the associated <u>line/trunk frames</u> has a <u>time slot</u> assigned in the upstream and the downstream directions of PCM busses 610 and 611.</i></b>”</i></p> <p><i>See e.g., Smith at ¶ 057, “each DSP module 608 and 609 further comprises a time-slot assignment means as part of its interface to PCM busses 610 and 611.”</i></p> <p><i>See e.g., Smith at ¶ 057, “DSP modules 608 and 609 can be made capable of performing the functions of dial-up digital modems, and that <b><i>DS1 modules 606 and 607 would then carry packets such as ATM cells instead of circuits, or could be replaced with industry standard digital packet interfaces such as 100BaseT.</i></b>”</i></p>

		<p><i>See e.g., Smith</i> at ¶ 056, “Each DS1 module 606 and 607 comprises a multiplicity of DS1s 604 and 605, which are coupled together through passive combiner 603 to provide a multiplicity of <b><i>internet-dedicated trunks 305</i></b> of FIG. 3.”</p> <p><i>See e.g.,</i> ¶¶ 071-072, claim limitations [7a]-[7f] <i>supra</i>.</p>
	<p>Function:</p> <p>“converting data between time-division multiplexed digital signals of a legacy line frame of a legacy line and packetized digital signals”</p>	<p><i>See e.g., Smith</i> at ¶ 057, “<b><i>Redundant digital signal processor (“DSP”) modules 608 and 609 provide the internet reroute capability[.]</i></b>”</p> <p><i>See e.g., Smith</i> at ¶ 068, “<b><i>DSP module 608 comprises ... DSP section 912[.]</i></b>”</p> <p><i>See e.g., Smith</i> at ¶ 071, “It will also be understood by one skilled in the art that <b><i>conventional modem signal processing algorithms may be programmed into DSP section 912 for <u>converting the analog modem tones represented in one or more PCM timeslots into digital packets</u></i></b>, and vice versa.”</p> <p><i>See e.g.,</i> claim limitations [7a]-[7f] <i>supra</i>.</p>

## 2. Dependent Claim 8

81. In my opinion, the *Smith Publication* discloses that the means for converting data between time-division multiplexed digital signals and packetized digital signals “includes utilizing a digital signal processor” as recited in Claim 8 of the ‘018 Patent. As discussed with respect to Claim 7, the *Smith Publication’s*

DSPs 608/609 disclose the claimed “means for converting.” In the Smith Publication, “DSP” is an acronym meaning “digital signal processor.” Ex. 1005, ¶ 057.

### 3. Independent Claim 10

82. Independent Claim 10 of the ‘018 Patent recites a method of utilizing a switching system interface like the one recited in independent Claim 7. It is my opinion that the prior art discloses each limitation of Claim 10 for reasons analogous to those discussed above with respect to Claim 7, as summarized in the claim chart below.

‘018 Patent Claims	<i>Smith Publication (“Smith”)</i>
[10a] A method of combining time-division multiplexed digital signals and packetized digital signals with a switching system interface used to bypass the common control and switch matrix of a legacy class 5 digital switch, the method comprising the steps of:	<p><i>See e.g., Smith at Abstract, “A method for bypassing the common control and switch matrix of a class 5 digital switch.”</i></p> <p><i>See e.g., Smith at ¶ 012, “What is needed is a means to bypass the common control and switch matrix of a legacy class 5 switching system in a way that permits any other switching system or media gateway to perform the associated functions, so that the legacy software may be discarded and/or any limitations of the legacy switch matrix may be overcome, while retaining the legacy line/trunk frames and cable plant and incurring minimal changes to the overall physical plant of the legacy class 5 central office.”</i></p> <p><i>See e.g., Smith at ¶ 015, “Therefore, what is needed is a method of bypassing the common control and switch matrix of a first class 5 digital switch, by providing a <u>switching system interface</u> which couples one or more line/trunk frames of the first digital switch to one or more digital transmission facilities that make up the remote end</i></p>



'018 Patent Claims	<i>Smith Publication ("Smith")</i>
	<p>of a DLC, where the local terminal is a second class 5 digital switch or media gateway.”</p> <p><i>See e.g., Smith at ¶¶ 045-046, “One embodiment of the method of the present invention is illustrated schematically in FIG. 3. ... A local terminal 301, typically comprising a class 5 digital switch or media gateway, resides either in another office (possibly in another city), or even in the same office, and couples to switching system interface 304 by means of one or more digital transmission facilities 302. <b><u>Remote terminal 303 of the DLC architecture comprises line/trunk frames 212 and switching system interface 304. Optional internet-dedicated trunks 305 carry intercepted internet traffic that is diverted away from local terminal 301.</u></b>”</i></p> <p><i>See e.g., Smith at ¶ 008, “Another trend is toward networks that carry both voice calls and data over common transport based on connectionless access protocols such as asynchronous transfer mode (“ATM”) and transport control protocol/ <b>internet protocol</b> (“TCP/IP”), <b>also referred to as ‘packet networks.’</b> ... ‘Media gateways’ are packet switches that also <b>convert the digital format of voice calls on trunks from legacy class 5 switches into the formats used in packet networks.</b>”</i></p> <p><i>See e.g., Smith at ¶ 030, “<b>FIG. 6 illustrates the component modules of a preferred embodiment of the switching system interface</b> of the present invention, that process and route pulse-code modulation signals.”</i></p> <p><i>See e.g., Smith at ¶ 057, “<b>Redundant digital signal processor (“DSP”) modules 608 and 609 provide the internet reroute capability</b> mentioned above. ... It will be further seen by one skilled in the art that DSP modules 608 and 609 can be made capable of performing the functions of dial-up digital modems, and that DS1 modules 606 and 607 would then carry packets such as ATM cells instead of circuits, or could be replaced with industry standard digital</i></p>

'018 Patent Claims	<i>Smith Publication ("Smith")</i>
	<p>packet interfaces such as 100BaseT."</p> <p><i>See e.g., Smith</i> at ¶ 033, "FIG. 9 illustrates schematically the component parts of a preferred embodiment of a shelf controller and a DSP module that are used to identify dial-up internet calls."</p> <p><i>See e.g., Smith</i> at ¶ 068, "<b>DSP module 608 comprises</b> data memory 907, CPU section 909, redundant management interfaces 910 and 911, <b>DSP section 912</b>, and redundant time slot assignment means 913 and 914."</p> <p><i>See e.g., Smith</i> at ¶ 071, "It will also be understood by one skilled in the art that <b><i>conventional modem signal processing algorithms may be programmed into DSP section 912 for converting the analog modem tones represented in one or more PCM timeslots into digital packets</i></b>, and vice versa."</p> <p><i>See also</i> ¶¶ 002-004, 012,015, '018, 019, 023, 024, 032, 041, 045, 047, 072, FIGS. 1-9, Abstract, Claim 1, Claim 5.</p>
[10b] utilizing a switching system interface to bypass a common control and switch matrix of the digital class 5 switch;	<p><i>See e.g., Smith</i> at claim 1, "A method for <b><i>bypassing the common-control-and-switch matrix</i></b> of a first digital switching system for telecommunications networks, comprising: ... <b><i>providing a switching system interface</i></b> ... whereby said switching system interface enables a local terminal of said digital loop carrier architecture to directly operate said line/trunk frames, thus providing telecommunications service to subscribers connected to said line/trunk frames without the use of said common-control-and-switch matrix of said first digital switching system." <i>See also, Smith</i> at ¶ 015.</p> <p><i>See e.g., Smith</i> at FIGS. 3, 6, "<b><i>switching system interface 304</i></b>."</p> <p><i>See e.g., Smith</i> at ¶ 004, "The common control comprises, among other things, a stored program control system," and</p>

‘018 Patent Claims	<i>Smith Publication (“Smith”)</i>
	<p>¶ 045, “In this method the stored program control system 208 and switch matrix 210 of FIG. 2 are disconnected and replaced by switching system interface 304.” <i>See also, Smith</i> at ¶¶ 043-043 (“common control 208”).</p> <p><i>See also</i>, the passages cited above with respect to claim limitation 10[a].</p>
<p>[10c] accessing internal signals of the class 5 digital switching system used to control line and trunk interfaces of the class 5 digital switching system and convey data in and out of the line and trunk interfaces;</p>	<p><i>See e.g., Smith</i> at claim 1, “<b>accessing pulse-code modulation, timing, and management signals of said first digital switching system between a line/trunk frame and said common-control-and-switch matrix.</b>” <i>See also</i> ¶¶ 023, 047, Figs. 3-9.</p> <p><i>See e.g., Smith</i> at Claim 8, “A switching system interface ... comprising ... <b>at least one line/trunk pulse-code modulation interface, compatible with the pulse-code modulation signals used to operate said line/trunk frames of said first digital switching system</b> [.]”</p> <p><i>See e.g., Smith</i> at Claim 23, “method comprises <b>accessing the proprietary signals of a digital switching system</b> that communicate between the line/trunk frames and the common-control-and-switch matrix; <b>providing a switching system interface comprising interfaces compatible with the proprietary signals</b>[.]”</p> <p><i>See e.g., Smith</i> at ¶ 045, “PCM cables 213 are replaced by <b>PCM cables 308, which carry PCM between line/trunk frames 212 and switching system interface 304.</b> A subset of management cables 209 used for managing line/trunk frames 212 are replaced by <b>management cables 307, which carry management signals between the line/trunk frames and the switching system interface</b>[.]”</p> <p><i>See e.g., Smith</i> at ¶ 047, “internal wiring associated with administrative cables 209 and PCM cables 213 [of the prior art class 5 switching system] are still in place. In order to <b>access this internal wiring</b>, one or more specialized circuit</p>

'018 Patent Claims	<i>Smith Publication (“Smith”)</i>
	<p>modules 405 and 406 are installed in depopulated frames 403 and 404, in place of the removed prior art modules. Cable sets 401 and 402 connect specialized circuit modules 405 and 406 to switching system interface 304. Thus, <b><i>switching system interface 304 accesses [] all necessary busses and signals in order to manage line/trunk frames 212 and carry PCM data to and from these frames, while the potentially complex and/or old and fragile cabling associated with the various groups of equipment frames from the prior art class 5 switching system have been left intact and not disturbed.</i></b></p> <p><i>See e.g., Smith at ¶ 059 “redundant shelf controls 701 and 702 control all line trunk frames[.]”</i></p> <p><i>See also Smith at ¶¶ 023, 047, 053, FIGS. 2-9, Claim 8.</i></p> <p><i>See e.g., the passages cited above with respect to claim limitations 10[a]-10[b].</i></p>
<p>[10d] providing a switching system interface comprising at least one network interface connected to at least one digital transmission facility that is part of a network architecture, and comprising interfaces compatible with the internal signals; and</p>	<p><i>See e.g., Smith at claim 1, “providing a <b><i>switching system interface</i></b> comprising at least one <b><i>network interface</i></b> connected to at least one <b><i>digital transmission facility</i></b> that is part of a <b><i>digital loop carrier architecture</i></b>, and comprising interfaces <b><i>compatible with said pulse-code modulation, timing, and management signals.</i></b>”</i></p> <p><i>See e.g., Smith at Abstract “A switching system interface comprising <b><i>one or more network interfaces for terminating digital transmission facilities</i></b>[.]”</i></p> <p><i>See e.g., Smith at ¶ 023, “a switching system interface comprising ... <b><i>at least one network interface connected to the remote end of a corresponding digital transmission facility of a DLC architecture.</i></b>”</i></p> <p><i>See e.g., Smith at ¶ 030, “FIG. 6 illustrates the component modules of a preferred embodiment of the switching system interface [304] of the present invention, that process and route pulse-code modulation signals.”</i></p>

'018 Patent Claims	<i>Smith Publication ("Smith")</i>
	<p><i>See e.g., Smith at ¶ 055, “<b><u>digital transmission facilities 302 of FIG. 3 comprise redundant DS3 facilities terminating on A-plane DS3 module 601 and B-plane DS3 module 602</u></b> [of switching system interface 304].”</i></p> <p><i>See e.g., Smith at ¶ 032 “FIG. 8 illustrates schematically a preferred embodiment of a network interface [.]”</i></p> <p><i>See e.g., Smith at ¶¶ 060-062, “FIG. 8 illustrates schematically [that] this embodiment of the electronic module that can perform as either DS3 module 601 and DS3 module 602.”</i></p> <p><i>See e.g., Smith at ¶¶ 060-062, “The processing of the DS3 signal is conventional, as follows: DS3 facility 801 is coupled to DS3 line interface unit 802, which terminates the DS3 line signal, extracts clock and data, and monitors for line quality. The clock and data are coupled in turn to M13 multiplexer 804, Which terminates the DS3 framing patterns, translates the DS3 data into 28 DS1 signals and monitors for DS3 problems. The 28 DS1s 805 are coupled to 28 DS1 transceivers 806, Which terminate the DS1 framing pattern for each DS1, extract clock and data, and monitor for DS1 problems. The 28 PCM streams 807 from DS1 transceivers 806 are coupled to time slot assignment means 809, which is programmed to map selected timeslots between the PCM streams and redundant PCM busses 610 and 611.”</i></p> <p><i>See also ¶¶ 003-004, 012, 015, 019, 035-045, 053, 055, 060-065, Claims 8-9, FIGS. 2, 3-9.</i></p> <p><i>See e.g., the passages cited above with respect to claim limitations 10[a]-10[c].</i></p>
[10e] connecting the compatible interfaces of the switching system interface to	<p><i>See e.g., Smith at claim 1 “<b><i>connecting said compatible interfaces of said switching system interface to said line/trunk frame of said first digital switching system, whereby said switching system interface enables a local</i></b></i></p>

‘018 Patent Claims	Smith Publication (“Smith”)
<p>the internal signals of the class 5 digital switching system, the connection between the compatible interfaces and the internal signals enabling a terminal in the network architecture to directly operate the internal signals to provide telecommunications service to subscribers connected to the line and trunk interfaces without the use of the common-control-and-switch matrix of the class 5 digital switching system; and</p>	<p><b><i>terminal of said digital loop carrier architecture to directly operate said line/trunk frames, thus providing telecommunications service to subscribers connected to said line/trunk frames without the use of said common-control-and-switch matrix of said first digital switching system.”</i></b></p> <p><i>See e.g., Smith at ¶ 030, “FIG. 6 illustrates the component modules of a preferred embodiment of the <u>switching system interface</u> of the present invention, that process and <u>route</u> pulse-code modulation signals.”</i></p> <p><i>See e.g., Smith at ¶¶ 060-064, “line interface unit 802 [] terminates the DS3 line signal[.] ... M13 multiplexer 804 ... translates the DS3 data into 28 DS1 signals[.] ... The 28 PCM streams 807 from <b>DS1 transceivers 806 are coupled to time slot assignment means 809, which is programmed to map selected timeslots between the PCM streams and redundant PCM busses 610 and 611.</b> ...”</i></p> <p><i>See e.g., Smith at ¶ 054, “each circuit of the associated line/trunk frames has a time slot assigned in the upstream and the downstream directions of PCM busses 610 and 611.”</i></p> <p><i>See e.g., Smith at Claim 9, “[a] call processing means causes certain pulse-code modulation timeslots to be connected between said network interfaces and said line/trunk frames, by operating said individual time-slot assignment means on said network interfaces.”</i></p> <p><i>See e.g., Smith at Claim 8, FIGS. 6, 8, 9, “TSA” [time slot assignment].</i></p> <p><i>See also ¶¶ 015, 019, 023, 024, 030, 045, 047, 053-059, 062, FIG. 3-9, Claims 8-9.</i></p> <p><i>See e.g., the passages cited above with respect to claim limitations 10[a]-10[d].</i></p>

'018 Patent Claims	<i>Smith Publication ("Smith")</i>
[10f] converting time-division multiplexed digital signals to packetized digital signals through the switching system interface.	<p data-bbox="535 243 1425 411"><i>See e.g., Smith at ¶ 008, "Media gateways' are packet switches that also <b>convert the digital format of voice calls on trunks from legacy class 5 switches into the formats used in packet networks.</b>"</i></p> <p data-bbox="535 453 1386 579"><i>See e.g., Smith at FIG. 6 and ¶ 057, "<b>Redundant digital signal processor ("DSP") modules 608 and 609 provide the <u>internet reroute capability</u></b> mentioned above."</i></p> <p data-bbox="535 621 1425 789"><i>See e.g., Smith at ¶ 054, "each circuit of the associated <u>line/trunk frames</u> has <u>a time slot assigned in the upstream and the downstream directions of PCM busses 610 and 611.</u>"</i></p> <p data-bbox="535 831 1398 957"><i>See e.g., Smith at ¶ 057, "each DSP module 608 and 609 further comprises a time-slot assignment means as part of its interface to PCM busses 610 and 611."</i></p> <p data-bbox="535 999 1419 1251"><i>See e.g., Smith at ¶ 057, "DSP modules 608 and 609 can be made capable of performing the functions of dial-up digital modems, and that DS1 <b>modules 606 and 607 would then carry packets such as ATM cells instead of circuits, or could be replaced with industry standard digital packet interfaces such as 100BaseT.</b>"</i></p> <p data-bbox="535 1293 1430 1472"><i>See e.g., Smith at ¶ 056, "Each DS1 module 606 and 607 comprises a multiplicity of DS1s 604 and 605, which are coupled together through passive combiner 603 to provide a multiplicity of <b>internet-dedicated trunks 305</b> of FIG. 3."</i></p> <p data-bbox="535 1514 1373 1598"><i>See e.g., Smith at ¶ 068, "<b>DSP module 608 comprises ... DSP section 912[.]</b>"</i></p> <p data-bbox="535 1640 1406 1892"><i>See e.g., Smith at ¶ 071, "It will also be understood by one skilled in the art that <b>conventional modem signal processing algorithms may be programmed into DSP section 912 for <u>converting the analog modem tones represented in one or more PCM timeslots into digital packets</u></b>, and vice versa."</i></p>

'018 Patent Claims	<i>Smith Publication</i> (“ <i>Smith</i> ”)
	<i>See e.g.</i> , the passages cited above with respect to claim limitations 10[a]-10[e].

#### 4. Dependent Claim 13

83. Claim 13 recites “connecting a digital signal processor within the telecommunications network to the second connection to enable the media gateway to communicate with the internal signals.” The claim is difficult to decipher because the terms “second connection” and “media gateway” lack antecedent basis. I have reviewed the ‘018 Patent specification for guidance. In the detailed description section of the ‘018 Patent, the term “media gateway” appears only once, describing that switching system interface includes a DS1 interface that can connect to a media gateway via a DS1 facility. Ex. 1001, 5:7-26.

84. It is my opinion that the *Smith Publication* provides at least equivalent disclosure. The *Smith Publication*’s switching system interface 304 includes a DS3 interface 601/602 that can connect to a media gateway (local terminal 301) via a digital transmission facility 302. Ex. 1005, FIGS. 3, 6, ¶ 046 (local terminal 301 can be a media gateway). The *Smith Publication* describes digital transmission facility 302 as a DS3 facility.

85. In my opinion the DS3 facility disclosed by the *Smith Publication* is analogous to the DS1 facility disclosed by the ‘018 Patent. For example, DS3s and DS1s are similar in that both are part of the same Digital Signal (“DS”) hierarchy.



A DS3 (44.184 Mbps), however, operates at a higher data rate than a DS1 (1.544 Mbps). As explained in the *Smith Publication*, a DS3 may comprise 28 multiplexed DS1s (which is referred to as channelized, or M13 format). Alternatively, a clear-channel, or unchannelized, DS3 comprises a single data stream (no multiplexing). Either way, one of ordinary skill in the art would understand how to communicate with a media gateway over either a DS1 or a DS3.

86. The '018 Patent specification lacks any clear disclosure regarding the claimed connection to a DSP that enables the media gateway to communicate with the internal signals. The only reference to "DSP" in the '018 Patent describes format converter (FC) 312. Ex. 1001, 5:63. Format converter 312 performs packet conversion, and the '018 Patent describes packet conversion as functionality of a media gateway. *Id.*, 2:8-11. In my opinion, the *Smith Publication* provides at least equivalent disclosure: "DSP" modules 608/609 perform media gateway functionality (packet conversion) and communicate with internal signals (via PCM connections to the line/trunk frames). *See e.g.*, Ex. 1005, ¶¶ 008, 045, 054, 068, 071, FIG. 3, FIG. 6.

87. Alternatively, it is my opinion that the limitation is also met by the *Smith Publication's* use of a media gateway as local terminal 301. As shown in FIG. 3 and FIG. 6, the media gateway/local terminal 301 communicates with internal signals of the line/trunk frames 212 via switching system interface 304.

The *Smith Publication* further discloses that media gateways perform TDM-to-packet conversion (§ 008) and that a DSP can be used to perform conventional packet conversion algorithms (§ 071).

## **5. Dependent Claim 14**

88. It is my opinion that the *Smith Publication* discloses “receiving signals originating from a line trunk frame” as recited in Claim 14 of the ‘018 Patent. In *Smith Publication’s* FIG. 3, switching system interface 304 receives signals from line/trunk frame 212.

89. It is my opinion that the *Smith Publication* discloses “extracting Pulse Code Modulation (PCM) data and signal information from these signals,” and “transmitting the PCM data on a timeslot” as recited in Claim 14. For example, “line/trunk frames 212 contains electronic modules that interface between various lines and trunks, such as analog two-wire and four-wire and digital four-wire, and pulse code modulation (“PCM”) busses that carry digital representations of voice and data.” Ex. 1005 at § 041. Figure 6 of the *Smith Publication* illustrates PCM optical interfaces 612/613 that interface between the line/trunk frames and internal PCM busses 610/611 such that “each circuit of the associated line/trunk frames has a time slot assigned in the upstream and the downstream directions of PCM busses 610 and 611.” *Id.*, § 054. That is, the line/trunk interfaces extract the incoming PCM data for transmission on the internal PCM busses. As a note, in the case of

the line frames that terminate subscriber loops via the loop plant and MDF, the line interfaces (via a component call a SLIC) would convert the analog signal into PCM for transport within the switching system interface.

90. In my opinion, the *Smith Publication* discloses “packetizing the PCM data, and transmitting the packetized data to an external IP address” as recited in Claim 14. FIG. 6 shows that PCM busses 610/611 connect to DSP modules 608/609 that send the data to DS1 modules 606/607. The *Smith Publication* states “DSP modules 608 and 609 can be made capable of performing the functions of dial-up digital modems, and that DS1 modules 606 and 607 would then carry packets such as ATM cells instead of circuits.” Ex. 1005, ¶ 057. The DS1 modules 607/608 send the packets to “internet-dedicated trunks 305” which “carry intercepted internet traffic that is diverted away from local terminal 301.” Ex. 1005, ¶¶ 046, 049. FIG. 6 shows the internet-dedicated trunk 305 connects switching system interface 304 to external equipment using “industry standard digital packet interfaces.” *Id.* ¶ 57, ¶ 72 (“digital packets are exchanged with an **external** packet router through DS1 module 606 or 607”). The *Smith Publication* discloses “internet protocol” (IP), an industry standard for digital packets. *Id.* ¶ 8. It is my opinion that one of ordinary skill in the art would understand internet protocol to use an IP address to identify where to send the packets. Because the switching system interface sends the packets to an external router, the IP address of

the external router would necessarily be an external address.

**VIII. Claims 1-2 are unpatentable as obvious under § 103 in view of the *Smith Publication* and *Anderson***

91. It is my opinion that Claims 1-2 are unpatentable as obvious in view of the *Smith Publication* and *Anderson*.

**1. Independent Claim 1**

92. Claim 1 of the '018 Patent recites a “switching system converter” comprising a “switching system interface” and a “means for converting data.” It is my opinion that the *Smith Publication* discloses the “switching system interface” recited in limitations 1[a]-1[f] of Claim 1 for reasons analogous to those discussed above with respect to limitations 7[a]-7[f] of Claim 7. It is also my opinion that the combination of the *Smith Publication* and *Anderson* render obvious the “means for converting data” recited in limitation 1[g] of Claim 1 for the reasons discussed below.

93. In Claim 1 of the '018 Patent, the “means for converting data” converts between “time-division multiplexed digital signals of a legacy line frame of a legacy line and packetized digital signals utilizing pulse code modulation (PCM) data transport.” It is my understanding that during prosecution of the '018 Patent, the Examiner rejected this limitation as disclosed by *Anderson*. Ex. 1004, p. 81. In response, the Applicant substantially amended Claim 1 by adding components of the switching system interface, stating that the amendment was

made to “distinguish the present invention from [] *Anderson*.” Ex. 1004, p. 67.

The amendment is reproduced below:

1. (Currently Amended) A switching system converter ... comprising:

a switching system interface having means for bypassing a common control and switch matrix of a class 5 digital switch, the switching system interface having: ~~and;~~

at least one network interface for terminating a digital transmission facility that is part of a network architecture;

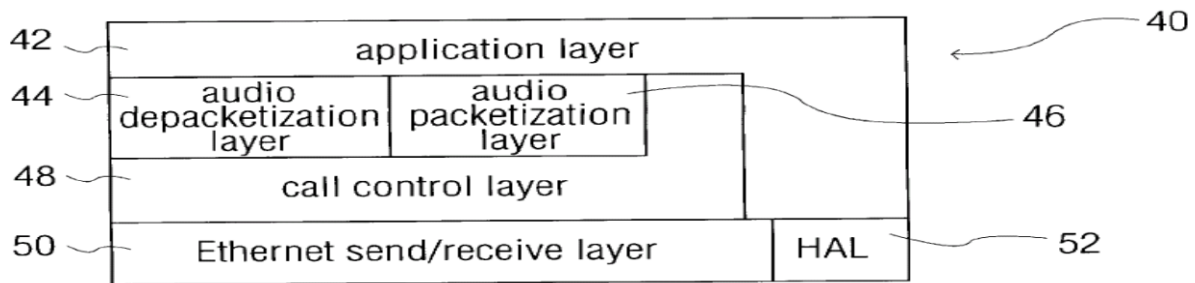
at least one line/trunk interface, compatible with internal signals used to operate the line/trunk interface of the class 5 digital switching system; and

a switching means, connected to the network interface and to the line/trunk interface, for routing data between the network interfaces and the line/trunk interface; and

means for converting ~~the~~ data between time-division multiplexed digital signals of a legacy line frame of a legacy line and packetized digital signals utilizing pulse code modulation (PCM) data transport.

Ex. 1004, p. 61. The *Smith Publication*, which the Examiner did not consider during prosecution, discloses the features of the switching system interface that were introduced by amendment to overcome the rejection based on *Anderson*. See the discussion of Claim 7 above. It is my understanding that the Applicant never distinguished the “means for converting data” limitation from *Anderson*.

94. *Anderson* discloses a system to “enable [a] time-division multiplexed signal to be converted into a packet-based digital signal.” Ex. 1006, 2:17-20. In Figure 2, *Anderson* illustrates a protocol stack 40 used in the system. Ex. 1006, 5:26-45.



**Ex. 1006 (*Anderson*) at Figure 2**

95. Protocol stack 40 includes audio packetization layer 46. *Anderson* describes receiving analog signals from a communication device (e.g., telephone or central office lines), converting the analog signals to a stream of digital data, and passing the digital data to audio packetization software. *Id.*, 5:46-66. The “audio packetization software builds data packets from the stream of digital data” and “compresses the packets using standard compression techniques (at 68), such as pulse code modulation (PCM) compression (e.g., G.711)[.]” *Id.*, 5:46-6:7. After PCM compression, the audio packetization software sends the PCM packets for delivery over the Ethernet (i.e., a packet network). *Id.*, 6:19-28.

96. In my opinion, it would have been obvious to combine utilizing pulse code modulation (PCM) data transport (as disclosed by *Anderson*) with the

switching system interface disclosed by the *Smith Publication*. The *Smith Publication* already discloses converting time-division multiplexed digital signals of a legacy line to packetized digital signals. In particular, DSP modules 608 and 609 provide “internet reroute capability.” Ex. 1004, ¶ 057. Each DSP module 608/609 comprises a time-slot assignment means that interfaces with PCM busses 610/611 (the busses that the *Smith Publication* describes as providing time slots from legacy line/trunk frames). *Id.*, ¶¶ 054, 057. DSP modules 608/609 perform digital modem functionality to send “packets such as ATM cells,” over “industry-standard digital packet interfaces such as 100BaseT [Ethernet].” *Id.*, ¶ 054.

97. The *Smith Publication* discloses sending audio (voice calls) over packet networks. *Id.*, ¶ 008. The *Smith Publication* also discloses PCM (DSP modules 608/609 comprise DSP section 912 programmed with “conventional” algorithms for “converting the analog modem tones represented in one or more PCM timeslots into digital packets, and vice versa.”). *Id.*, ¶¶ 68, 71. *Smith Publication* also discloses sending the digital packets from DSP modules 608/609 to DS1 modules 606/607 (FIG. 6) and that DS1s can communicate PCM streams (¶ 62).

98. It is my opinion that one of ordinary skill in the art would have been motivated to combine the *Smith Publication* with *Anderson* for at least the following reasons.

99. In my opinion, it would have been obvious to combine prior art elements disclosed by the *Smith Publication* and *Anderson* according to known methods to yield predictable results. The *Smith Publication* discloses a switching system interface 304 that converts TDM timeslots of legacy line/trunk frames to packets. *Anderson* discloses utilizing PCM data transport. For example, *Anderson* can take PCM from a digital telephone line interface module (TLIM) and packetize the data, which is already PCM compressed at this point. Ex. 1006, 5:26-6:18. *Anderson* further discloses that this can be done on a plug in module. See e.g., Ex. 1006 at 4:24-35 (stating that the components described by *Anderson* can be modules that plug into a motherboard). In my opinion, in light of the current state of knowledge in the industry at the time, combining the teachings of *Anderson* and the *Smith Publication* would make sense and be obvious. In my opinion, one is not changing anything in the switching system interface disclosed by the *Smith Publication*, but merely putting the packetization module from *Anderson* into the switching system interface. That is, in my opinion, at the time, taking analog modem samples and converting to PCM then to packet (as disclosed by the *Smith Publication*) is interchangeable with taking audio from *Anderson* and doing the same. It would have been predictable that PCM compression could be used in *Smith Publication's* switching system interface 304, for example, to send audio signals from the line/trunk frames over a packet network, as disclosed by



*Anderson.*

100. In my opinion, it would be a simple substitution to substitute the packetization technique disclosed by the *Smith Publication* with the packetization technique involving PCM compression, as disclosed by *Anderson*. The results would have been predictable to one of ordinary skill in the art. The *Smith Publication* already provides at least some disclosure of utilizing PCM within the context of packetization. For example, in the *Smith Publication*, the DSP modules 608/609 that perform packetization receive PCM timeslots from PCM busses 610/611. In addition, the *Smith Publication* describes sending audio (voice) over a packet network (§ 008). *Anderson* discloses using PCM in an “audio packetization” layer. It would have been predictable that the PCM compression disclosed by *Anderson* could be used in the switching system interface disclosed by the *Smith Publication*, for example, to send audio signals from the line/trunk frames over a packet network.

101. In my opinion, it would have been obvious to use the known packetization technique disclosed by *Anderson*, which uses PCM compression, to improve the *Smith Publication*’s switching system interface, which is similar to the device disclosed by *Anderson* in that it packetizes TDM timeslots from central office lines, in the same way. For example, *Anderson* discloses that using PCM to send audio over a packet network, and the *Smith Publication*’s switching system

interface could be improved in the same way by using PCM.

102. In my opinion, it would have been obvious to apply *Anderson's* known technique for packetization, which uses PCM compression, to the known switching system interface disclosed by the *Smith Publication*. The switching system interface was ready for improvement, for example, the switching system interface already provided the capability of receiving PCM timeslots from central office lines and converting the PCM timeslots to packets for routing to the Internet. In addition, the switching system interface already provided the capability of receiving audio (voice) in the PCM timeslots. It would have been predictable in view of *Anderson* that using PCM compression could improve the switching system interface, for example, to send audio over the packet network. For example, *Anderson* discloses that PCM compression could be used in a device that packetizes timeslots carrying audio from ISDN PRI, BRI, T1/E1 public or private digital telephone networks. *See* Ex. 1006, 5:2-5.

103. In my opinion, it would have been obvious to try the combination of the *Smith Publication* and *Anderson*. There are a finite number of identified solutions to try. The identified solutions include 1) packetizing without compression, and 2) packetizing with compression. With respect to the latter, industry standards provided a finite number of identified solutions for compression (e.g., *Anderson* discloses a PCM standard, G.711, and 5 other standards for

different compression types, Ex. 1006, 5:66-6:7). It would have been reasonable to expect that the packets disclosed by the *Smith Publication* could be successfully compressed using PCM at least because *Anderson* had successfully used PCM in a similar context (converting TDM signals from central office lines to packets for transmission over a packet network).

104. In my opinion, *Anderson's* known work in a field of endeavor (the use of PCM compression in the field of packetizing TDM signals from digital telephone lines) may prompt variations of it for use in the same field (*Smith Publication* also packetizes TDM signals from central office lines) based on design incentives (send audio over the packet network) if the variations are predictable to one of ordinary skill in the art (the variation was predictable based on *Anderson's* successful use of PCM in the same field).

105. In my opinion, there is some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. Both *Smith Publication* and *Anderson* relate to packetizing TDM signals received from central office lines (e.g., T1/E1, ISDN PRI, BRI). *Anderson* provides motivation to use PCM (to send audio over the packet network). Ex. 1006, 5:66-6:7.

106. The following claim chart identifies where each limitation is found in the prior art.

'018 Patent Claims	<i>Smith Publication ("Smith") and Anderson</i>
<p>[1a] A switching system converter providing conversion between time-division multiplexed digital signals and packetized digital signals used to bypass a common control and switch matrix of a class 5 digital switch,</p>	<p><i>See e.g., Smith at ¶ 012, "What is needed is <b>a means to bypass the common control and switch matrix of a legacy class 5 switching system</b> in a way that permits any other switching system or media gateway to perform the associated functions, so that the legacy software may be discarded and/or any limitations of the legacy switch matrix may be overcome, <b>while retaining the legacy line/trunk frames and cable plant and incurring minimal changes to the overall physical plant of the legacy class 5 central office.</b>"</i></p> <p><i>See e.g., Smith at ¶ 015, "Therefore, what is needed is a method of <b>bypassing the common control and switch matrix of a first class 5 digital switch, by providing a switching system interface which couples one or more line/trunk frames of the first digital switch to one or more digital transmission facilities</b> that make up the remote end of a DLC, where the local terminal is a second class 5 digital switch or media gateway."</i></p> <p><i>See e.g., Smith at ¶¶ 045-046, "One embodiment of the method of the present invention is illustrated schematically in FIG. 3. ... A local terminal 301, typically comprising a class 5 digital switch or media gateway, resides either in another office (possibly in another city), or even in the same office, and couples to switching system interface 304 by means of one or more digital transmission facilities 302. <b>Remote terminal 303 of the DLC architecture comprises line/trunk frames 212 and switching system interface 304. Optional internet-dedicated trunks 305 carry intercepted internet traffic that is diverted away from local terminal 301.</b>"</i></p>

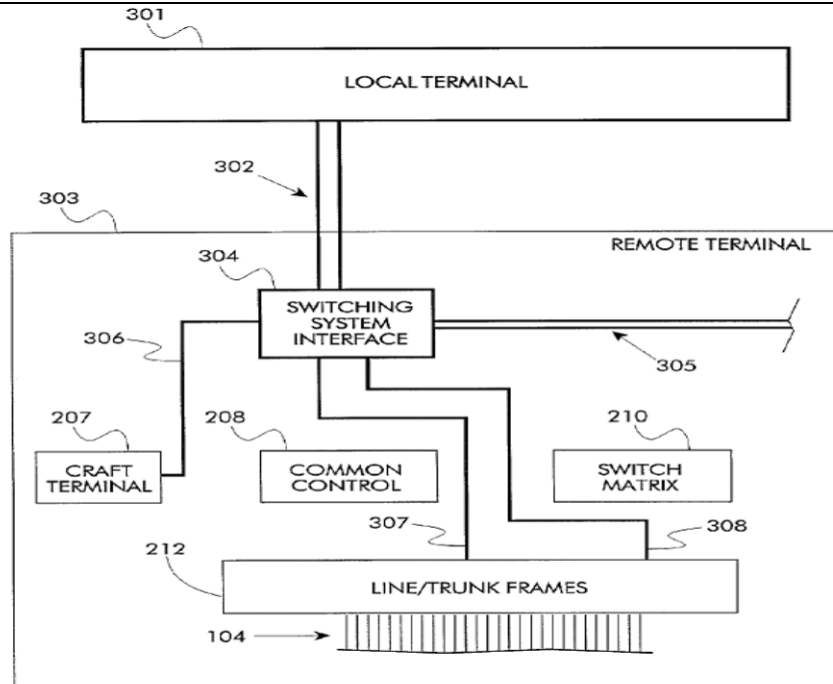


Fig. 3

See e.g., *Smith* at ¶ 008, “Another trend is toward networks that carry both voice calls and data over common transport based on connectionless access protocols such as asynchronous transfer mode (“ATM”) and transport control protocol/ *internet protocol* (“TCP/IP”), *also referred to as ‘packet networks.’* ... ‘Media gateways’ are packet switches that also *convert the digital format of voice calls on trunks from legacy class 5 switches into the formats used in packet networks.*”

See e.g., *Smith* at ¶ 030, “**FIG. 6 illustrates the component modules of a preferred embodiment of the switching system interface** of the present invention, that process and route pulse-code modulation signals.”

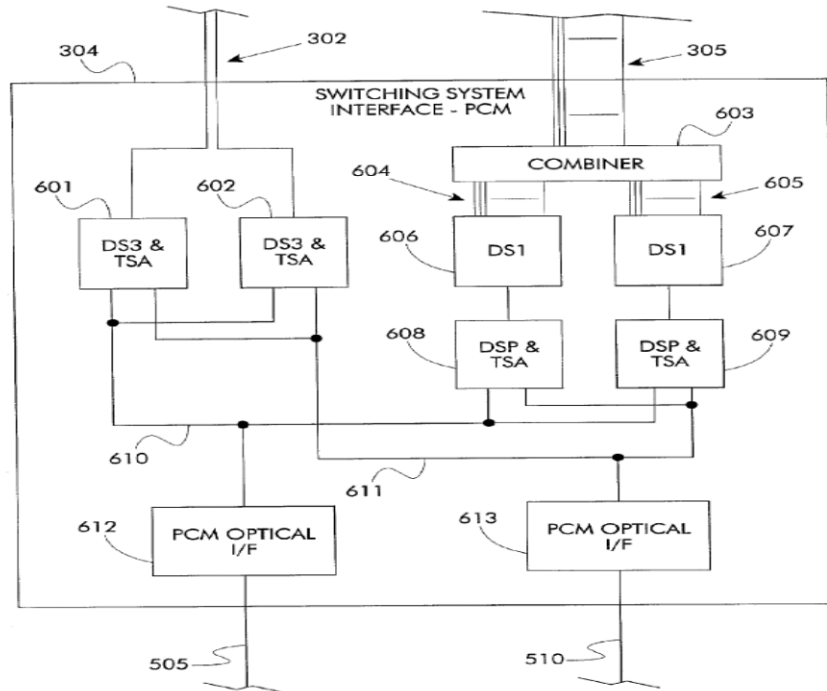


Fig. 6

See e.g., Smith at ¶ 057, “**Redundant digital signal processor (“DSP”) modules 608 and 609 provide the internet reroute capability** mentioned above. ... It will be further seen by one skilled in the art that DSP modules 608 and 609 can be made capable of performing the functions of dial-up digital modems, and that DS1 modules 606 and 607 would then carry packets such as ATM cells instead of circuits, or could be replaced with industry standard digital packet interfaces such as 100BaseT.”

See e.g., Smith at ¶ 033, “FIG. 9 illustrates schematically the component parts of a preferred embodiment of a shelf controller and a DSP module that are used to identify dial-up internet calls.”

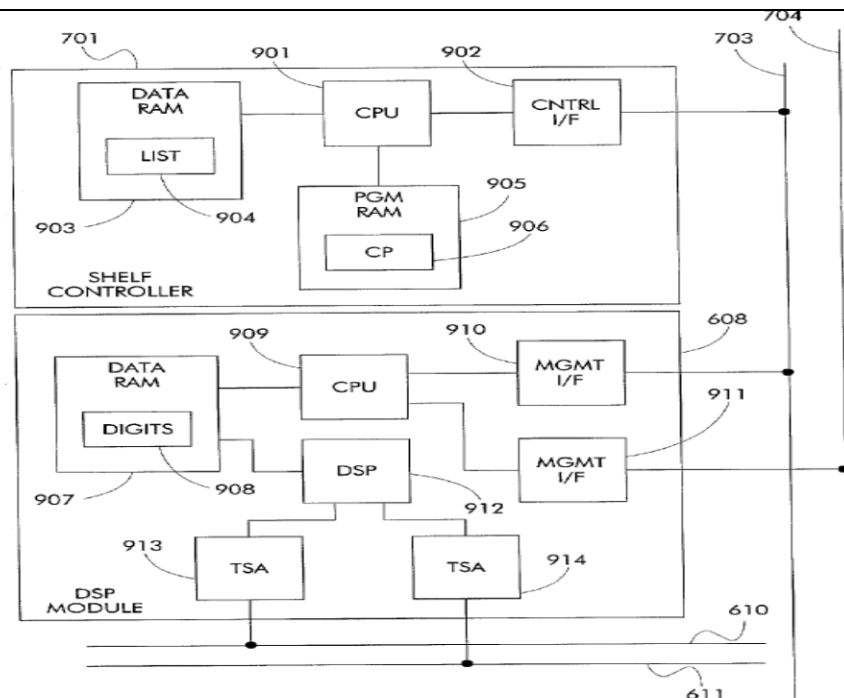


Fig. 9

See e.g., *Smith* at ¶ 068, “**DSP module 608** comprises data memory 907, CPU section 909, redundant management interfaces 910 and 911, **DSP section 912**, and redundant time slot assignment means 913 and 914.”

See e.g., *Smith* at ¶ 071, “It will also be understood by one skilled in the art that **conventional modem signal processing algorithms may be programmed into DSP section 912 for converting the analog modem tones represented in one or more PCM timeslots into digital packets**, and vice versa.”

See also ¶¶ 002-004, 012, 015, ‘018, 019, 023, 024, 032, 041, 045, 047, 072, FIGS. 1-9, Abstract, Claim 1, Claim 5.

**‘018 Patent Claims**

***Smith Publication (“Smith”) and Anderson***

[1b] the switching system converter comprising: a switching system interface

See e.g., FIGS. 3, 6, “**switching system interface 304**”

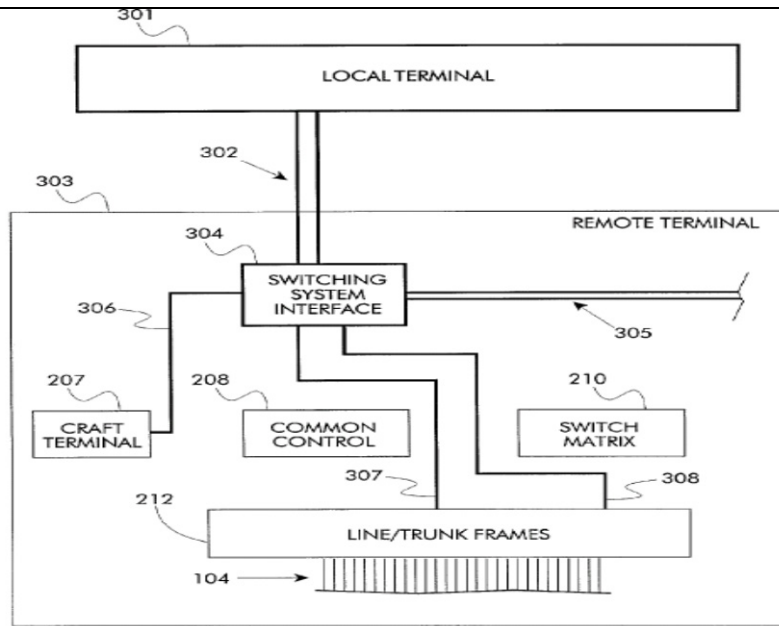


Fig. 3

See e.g., claim limitation [1a] *supra*.

'018 Patent Claims	'018 Patent § 112(6)	<i>Smith and Anderson</i>
[1c] having means for bypassing a common control and switch matrix of a class 5 digital switch,	Structure:  line/trunk interfaces, DS1 interfaces, and equivalents thereof.	<p>See e.g., <i>Smith</i> at FIG. 3 and ¶ 045, “One embodiment of the method of the present invention is illustrated schematically in FIG. 3. In this method the stored program control system 208 and switch matrix 210 of FIG. 2 are disconnected and replaced by switching system interface 304. ... PCM cables 213 are replaced by <b>PCM cables 308, which carry PCM between line/trunk frames 212 and switching system interface 304.</b>”</p> <p>See e.g., <i>Smith</i> at FIG. 3 and ¶ 046, “A local terminal</p>



	<p><b><i>301... couples to switching system interface 304 by means of one or more digital transmission facilities 302.”</i></b></p> <p><i>See e.g., Smith at FIG. 6 and ¶ 053, “FIG. 6 illustrates schematically the internal PCM flow of a version of the preferred embodiment of the switching system interface of the present invention. <b>This version uses DS3’s as digital transmission facilities to the local terminal, and DS1’s as dedicated internet trunks.</b>”</i></p> <p><i>See also, Smith at FIG. 8 and ¶¶ 060-065.</i></p> <p><i>See e.g., Smith at ¶ 015, “bypassing the common control and switch matrix of a first class 5 digital switch, by providing a switching system interface which <b>couples one or more line/trunk frames of the first digital switch to one or more digital transmission facilities.</b>”</i></p> <p><i>See e.g., Smith at ¶ 052, “The technician now commands line/trunk frames 212 to change operation over to B-plane, which causes service to be carried through switching system interface 304 and thus through local terminal 301. ... <b>[The technician] installs the</b></i></p>
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		<p><i>corresponding specialized circuit modules 502 and 504</i> comprising A-plane 501, and installs cable sets 503 and 508. Now redundancy is available through switching system interface 304, and <i>the common control and switch matrix of prior art class 5 switching system 102 have been completely bypassed.</i>”</p> <p>See e.g., <i>Smith</i> at ¶ 045, “PCM cables 213 are replaced by <i>PCM cables 308, which carry PCM between line/trunk frames 212 and switching system interface 304.</i> A subset of management cables 209 used for managing line/trunk frames 212 are replaced by <i>management cables 307, which carry management signals between the line/trunk frames and the switching system interface[.]</i>”</p> <p>See e.g., <i>Smith</i> at ¶ 047, “internal wiring associated with administrative cables 209 and PCM cables 213 [of the prior art class 5 switching system] are still in place. In order to <i>access this internal wiring</i>, one or more specialized circuit modules 405 and 406 are installed in depopulated frames 403 and 404, in place of the removed prior art modules. Cable sets</p>
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		<p>401 and 402 connect specialized circuit modules 405 and 406 to switching system interface 304. Thus, <i>switching system interface 304 accesses [] all necessary busses and signals in order to manage line/trunk frames 212 and carry PCM data to and from these frames, while the potentially complex and/or old and fragile cabling associated with the various groups of equipment frames from the prior art class 5 switching system have been left intact and not disturbed.</i>”</p> <p><i>See e.g., claim limitations [1a]-[1b] supra.</i></p>
	<p>Function:</p> <p>“bypassing a common control and switch matrix of a class 5 digital switch”</p>	<p><i>See e.g., Smith at ¶ 052, “The technician now commands line/trunk frames 212 to change operation over to B-plane, which causes service to be carried through switching system interface 304 and thus through local terminal 301. ... [The technician] installs the corresponding specialized circuit modules 502 and 504 comprising A-plane 501, and installs cable sets 503 and 508. Now redundancy is available through switching system interface 304, and <b>the common control and switch matrix of prior art class 5</b></i></p>

		<p><i>switching system 102 have been completely bypassed.”</i></p> <p><i>See e.g., Smith at claim 8. A switching system interface for <u>bypassing the common-control-and-switch matrix of a first digital switching system</u> for telecommunications networks, comprising: at least one network interface for terminating a digital transmission facility that is part of a digital loop carrier architecture, at least one line/trunk pulse-code modulation interface, compatible with the pulse-code modulation signals used to operate said line/trunk frames of said first digital switching system, [and] a time-slot assignment means, connected to said network interfaces and to said line/trunk pulse-code modulation interfaces, for coupling certain pulse-code modulation timeslots between said network interfaces and said line/trunk pulse-code modulation interfaces[.]</i></p> <p><i>See e.g., claim limitations [1a]-[1b] supra.</i></p>
<b>‘018 Patent Claims</b>	<b><i>Smith Publication (“Smith”) and Anderson</i></b>	
<b>[1d] the switching</b>	<i>See e.g., Smith at Abstract “A switching system interface</i>	

system interface having: at least one network interface for terminating a digital transmission facility that is part of a network architecture;

comprising *one or more network interfaces for terminating digital transmission facilities*[.]”

See e.g., *Smith* at ¶ 023, “a switching system interface comprising ... *at least one network interface connected to the remote end of a corresponding digital transmission facility of a DLC architecture.*”

See e.g., *Smith* at ¶ 030, “*FIG. 6 illustrates the component modules of a preferred embodiment of the switching system interface [304] of the present invention, that process and route pulse-code modulation signals.*”

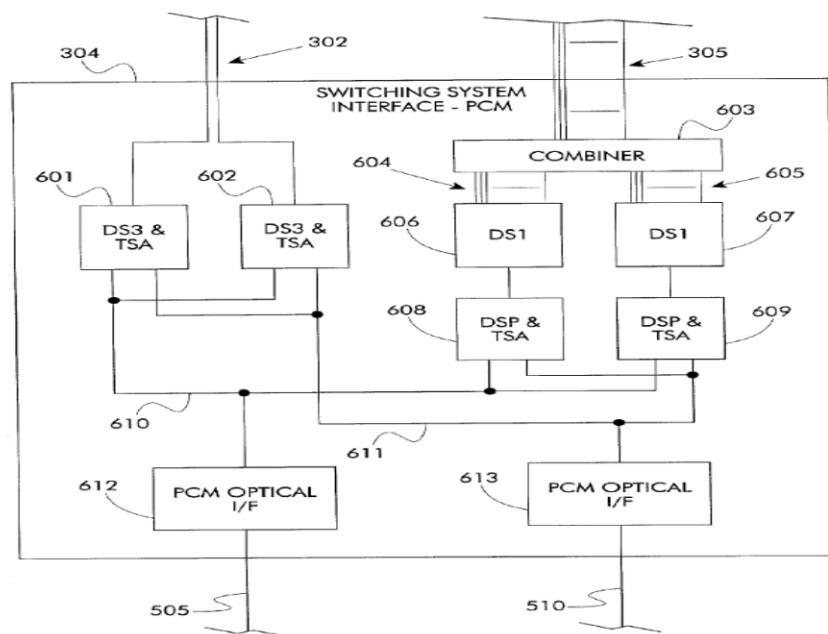


Fig. 6

See e.g., *Smith* at ¶ 055, “*digital transmission facilities 302 of FIG. 3 comprise redundant DS3 facilities terminating on A-plane DS3 module 601 and B-plane DS3 module 602* [of switching system interface 304].”

See e.g., *Smith* at ¶ 032 “FIG. 8 illustrates schematically a preferred embodiment of a network interface [.]”

See e.g., *Smith* at ¶¶ 060-062, “FIG. 8 illustrates schematically [that] this embodiment of the electronic

module that can perform as either DS3 module 601 and DS3 module 602.”

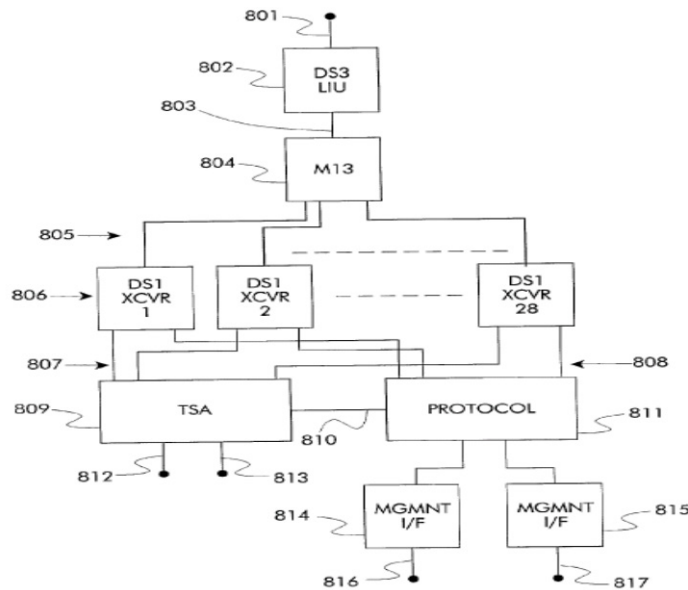


Fig. 8

See e.g., *Smith* at ¶¶ 060-062, “The processing of the DS3 signal is conventional, as follows: DS3 facility 801 is coupled to DS3 line interface unit 802, which terminates the DS3 line signal, extracts clock and data, and monitors for line quality. The clock and data are coupled in turn to M13 multiplexer 804, Which terminates the DS3 framing patterns, translates the DS3 data into 28 DS1 signals and monitors for DS3 problems. The 28 DS1s 805 are coupled to 28 DS1 transceivers 806, Which terminate the DS1 framing pattern for each DS1, extract clock and data, and monitor for DS1 problems. The 28 PCM streams 807 from DS1 transceivers 806 are coupled to time slot assignment means 809, which is programmed to map selected timeslots between the PCM streams and redundant PCM busses 610 and 611.”

See also ¶¶ 003-004, 012, 015, 019, 035-045, 053, 055, 060-065, Claims 8-9, FIGS. 2, 3-9.

See e.g., claim limitations [1a]-[1c] *supra*.

'018 Patent Claims	<i>Smith Publication (“Smith”) and Anderson</i>
<p>[1e] at least one line/trunk interface, compatible with internal signals used to operate the line/trunk interface of the class 5 digital switching system; and</p>	<p>See e.g., <i>Smith</i> at Claim 8, “A switching system interface ... comprising ... <b><i>at least one line/trunk pulse-code modulation interface, compatible with the pulse-code modulation signals used to operate said line/trunk frames of said first digital switching system</i></b> [.]”</p> <p>See e.g., <i>Smith</i> at Claim 23, “method comprises <b><i>accessing the proprietary signals of a digital switching system</i></b> that communicate between the line/trunk frames and the common-control-and-switch matrix; <b><i>providing a switching system interface comprising interfaces compatible with the proprietary signals</i></b>[.]”</p> <p>See e.g., <i>Smith</i> at ¶ 045, “PCM cables 213 are replaced by <b><i>PCM cables 308, which carry PCM between line/trunk frames 212 and switching system interface 304</i></b>. A subset of management cables 209 used for managing line/trunk frames 212 are replaced by <b><i>management cables 307, which carry management signals between the line/trunk frames and the switching system interface</i></b>[.]”</p> <div data-bbox="565 1129 1393 1816"> </div> <p style="text-align: center;">Fig. 3</p>

	<p><i>See e.g., Smith at ¶ 047, “internal wiring associated with administrative cables 209 and PCM cables 213 [of the prior art class 5 switching system] are still in place. In order to <b>access this internal wiring</b>, one or more specialized circuit modules 405 and 406 are installed in depopulated frames 403 and 404, in place of the removed prior art modules. Cable sets 401 and 402 connect specialized circuit modules 405 and 406 to switching system interface 304. Thus, <b>switching system interface 304 accesses [] all necessary busses and signals in order to manage line/trunk frames 212 and carry PCM data to and from these frames, while the potentially complex and/or old and fragile cabling associated with the various groups of equipment frames from the prior art class 5 switching system have been left intact and not disturbed.</b>”</i></p> <p><i>See e.g., Smith at ¶ 059 “<b>redundant shelf controls 701 and 702 control all line trunk frames</b>[.]”</i></p> <p><i>See also Smith at ¶¶ 023, 047, 053, FIGS. 2-9, Claim 8.</i></p> <p><i>See e.g., claim limitations [1a]-[1d] supra.</i></p>	
<b>‘018 Patent Claims</b>	<b>‘018 Patent § 112(6)</b>	<b><i>Smith and Anderson</i></b>
<b>[1f]</b> a switching means, connected to the network interface and to the line/trunk interface, for routing data between the network interfaces and the line/trunk interface; and	Structure:  PCM interface, line/trunk manager module, and/or timeslot interchange and equivalents thereof	<p><i>See e.g., Smith at FIG. 6 “PCM optical interface 612” and “PCM optical interface 613.” See also Smith at ¶ 054.</i></p> <p><i>See e.g., Smith at FIG. 7, “line/trunk manager 705” and “line/trunk manager 706.” See also Smith at ¶ 059.</i></p> <p><i>See e.g., Smith at ¶¶ 060-064, “line interface unit 802 [] terminates the DS3 line signal[.] ... M13 multiplexer</i></p>



		<p>804 ... translates the DS3 data into 28 DS1 signals[.] ... The 28 PCM streams 807 from <i>DS1 transceivers 806 are coupled to time slot assignment means 809, which is programmed to map selected timeslots between the PCM streams and redundant PCM busses 610 and 611. ...</i>”</p> <p><i>See e.g., Smith at ¶ 054, “each circuit of the associated line/trunk frames has a time slot assigned in the upstream and the downstream directions of PCM busses 610 and 611.”</i></p> <p><i>See e.g., Smith at Claim 9, “[a] call processing means causes certain pulse-code modulation timeslots to be connected between said network interfaces and said line/trunk frames, by operating said individual time-slot assignment means on said network interfaces.”</i></p> <p><i>See e.g., Smith at Claim 8, FIGS. 6, 8, 9, “TSA” [time slot assignment]. See also Smith at ¶¶ 045, 053-054, 062.</i></p> <p><i>See e.g., claim limitations [1a]-[1e] supra.</i></p>
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	<p>Function:</p> <p>“routing data between said network interfaces and said line/trunk interface”</p>	<p><i>See e.g., Smith</i> at Claim 1, “A method for bypassing the common-control-and-switch matrix of a first digital switching ... providing a <b><i>switching system interface comprising at least one network interface</i></b> ... and comprising interfaces compatible with said pulse-code modulation, timing, and management signals, <b><i>and connecting said compatible interfaces of said switching system interface to said line/trunk frame of said first digital switching system.</i></b>”</p> <p><i>See e.g., Smith</i> at ¶ 030, “<b><i>FIG. 6 illustrates the component modules of a preferred embodiment of the <u>switching system interface</u> of the present invention, that process and route pulse-code modulation signals.</i></b>”</p> <p><i>See also</i> ¶¶ 015, 019, 023, 024, 030, 045, 047, 053-059, 062, FIG. 3-9, Claims 8-9.</p> <p><i>See e.g., claim limitations [1a]-[1e] supra.</i></p>
<b>‘018 Patent Claims</b>	<b>‘018 Patent § 112(6)</b>	<b><i>Smith and Anderson</i></b>
[1g] means for converting data between time-division multiplexed digital signals of a	<p>Structure:</p> <p>format converter and equivalents thereof</p>	<p><i>See e.g., Smith</i> at FIG. 6, “DSP 608” and “DSP 609.”</p> <p><i>See e.g., Smith</i> at FIG. 6 and ¶ 057, “<b><i>Redundant digital</i></b></p>

<p>legacy line frame of a legacy line and packetized digital signals utilizing pulse code modulation (PCM) data transport.</p>		<p><i>signal processor (“DSP”) modules 608 and 609 provide the <u>internet reroute capability</u> mentioned above.”</i></p> <p><i>See e.g., Smith at ¶ 054, “each circuit of the associated <u>line/trunk frames</u> has a <u>time slot</u> assigned in the upstream and the downstream directions of PCM busses 610 and 611.”</i></p> <p><i>See e.g., Smith at ¶ 057, “each DSP module 608 and 609 further comprises a time-slot assignment means as part of its interface to PCM busses 610 and 611.”</i></p> <p><i>See e.g., Smith at ¶ 057, “DSP modules 608 and 609 can be made capable of performing the functions of dial-up digital modems, and that DS1 <b>modules 606 and 607 would then carry packets such as ATM cells instead of circuits, or could be replaced with industry standard digital packet interfaces such as 100BaseT.</b>”</i></p> <p><i>See e.g., Smith at ¶ 056, “Each DS1 module 606 and 607 comprises a multiplicity of DS1s 604 and 605, which are coupled together through passive combiner 603 to provide a multiplicity of</i></p>
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		<p><b>internet-dedicated trunks 305 of FIG. 3.”</b></p> <p><i>See e.g., ¶¶ 071-072, claim limitations [1a]-[1f] supra.</i></p>
	<p>Function:</p> <p>“converting data between time-division multiplexed digital signals of a legacy line frame of a legacy line and packetized digital signals”</p>	<p><i>See e.g., Smith at ¶ 057, “Redundant digital signal processor (“DSP”) modules 608 and 609 provide the internet reroute capability[.]”</i></p> <p><i>See e.g., Smith at ¶ 068, “DSP module 608 comprises ... DSP section 912[.]”</i></p> <p><i>See e.g., Smith at ¶ 071, “It will also be understood by one skilled in the art that conventional modem signal processing algorithms may be programmed into DSP section 912 for <u>converting the analog modem tones represented in one or more PCM timeslots into digital packets</u>, and vice versa.”</i></p> <p><i>See e.g., Anderson at 2:17-20, “Some of the products include accessories that interface with the Private Branch Exchange (PBX) to enable the time-division multiplexed signal to be converted into a packet-based digital signal.”</i></p> <p><i>See e.g., Anderson at 5:46-6:7: “audio packetization</i></p>

		<p>software builds data packets from the stream of digital data and ... compresses the packets using standard compression techniques (at 68), such as <b>pulse code modulation (PCM)</b> compression (e.g., G.711)[.]”</p> <p><i>See e.g., Anderson at 1:17-2:67; 4:25-6:29; FIGS. 1-3.</i></p> <p><i>See e.g., claim limitations [1a]-[1f] supra.</i></p>
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## 2. Dependent Claim 2

107. It is my opinion that the *Smith Publication-Anderson* combination discloses “the packetized PCM data transport is Internet Protocol (IP)” recited in Claim 2 of the ‘018 Patent. For the reasons discussed with respect to limitation [1g], it would have been obvious to utilize a packetized PCM data transport in view of the *Smith Publication* and *Anderson*. It would have been further obvious to use Internet Protocol (IP) because both the *Smith Publication* and *Anderson* disclose IP.

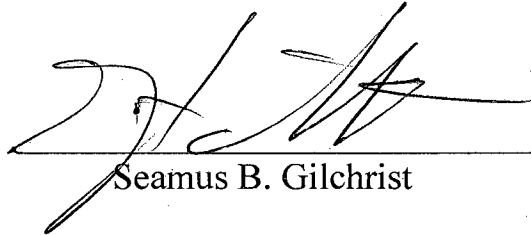
108. The *Smith Publication* discloses converting PCM timeslots to packets (§ 071) and carrying the packets, such as ATM cells, via industry standard digital packet interfaces (§ 57). The *Smith Publication* further discloses that Internet Protocol is a transport that is interchangeable with ATM. Ex. 1005, ¶ 008 (“Another trend is toward networks that carry both voice calls and data over

common transport based on connectionless access protocols such as asynchronous transfer mode (“ATM”) and transport control protocol/internet protocol (“TCP/IP”), also referred to as ‘packet networks’.”); see also ¶¶ 071, 072. In addition, it is my understanding that during prosecution, the Examiner rejected Claim 2 in view *Anderson’s* disclosure that a “well-known advantage of packetized voice (or audio) is the ability to transfer signals over wide area network infrastructures (e.g., the Internet)[.]” Ex. 1004, p. 81 (citing Ex. 1006, 2:7-20, emphasis added).

## IX. CONCLUSION

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

6/25/2015  
Date

  
Seamus B. Gilchrist