**UNITED STATES DISTRICT COURT**
**EASTERN DISTRICT OF TEXAS**
**MARSHALL DIVISION**

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| **DIFF SCALE OPERATION RESEARCH, LLC,**<br>***Plaintiff,***<br>v.<br>**HUAWEI TECHNOLOGIES CO., LTD. AND HUAWEI TECHNOLOGIES USA, INC.,**<br>***Defendants.*** | **Civil Action No._____**<br><br>**JURY TRIAL DEMANDED** |

**COMPLAINT FOR PATENT INFRINGEMENT**

DIFF Scale Operation Research, LLC ("Plaintiff"), by its undersigned counsel, bring this action and make the following allegations of patent infringement relating to U.S. Patent Nos.: 7,881,413 (the, "'413 patent"); 6,664,827 (the, "'827 patent"); 6,407,983 (the, "'983 patent"); 6,847,609 (the, "'609 patent"); 6,940,810 (the, "'810 patent"); 6,990,110 (the, "'110 patent"); 6,233,221 (the, "'221 patent"); and 6,859,430 (the, "'430 patent") (collectively, the "patents-in-suit"). Defendants Huawei Technologies Co., Ltd. and Huawei Technologies USA, Inc. ("Huawei" or "Defendants") infringes each of the patents-in-suit in violation of the patent laws of the United States of America, 35 U.S.C. § 1 *et seq*.

**INTRODUCTION**

1. This case arises from Huawei's infringement of a portfolio of semiconductor and network infrastructure patents. This patent portfolio arose from the groundbreaking work of ADC Telecommunications, Inc. ("ADC Telecommunications").

2. In 1935, ADC Telecommunications, then known as the Audio Development Company[1] was founded in Minneapolis, Minnesota by two Bell Laboratory engineers to create custom transformers and amplifiers for the broadcast radio industry. In the 1950s, ADC Telecommunications began to produce jacks, plugs, patch cords, and jack fields, which would be cornerstones for ADC Telecommunications' later entry into telecommunications equipment.[2]

3. In the late 1990s, ADC Telecommunications pioneered the development of microchips and network switches for the burgeoning telecommunications industry.[3] ADC Telecommunications' products included fiber-optic video, data, and voice transmission systems, and its clients included all the major domestic cable TV operators, numerous phone companies, and a majority of TV broadcasters.[4]

4. Prior licensing of ADC Telecommunications' patents confirms the significant value of ADC Telecommunications' innovations. In 2011, HTC the Taiwan based smartphone manufacturer, bought a portfolio of 82 patents and 14 pending applications related to mobile technology from ADC Telecommunications.[5] HTC asserted two of these patents against Apple before the International Trade Commission.

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[1] Audio Development Company was later renamed ADC Telecommunications, Inc. *U.S. Senate Executive Reports*, U.S. PRINTING OFFICE at 39 (1999) ("The story of ADC Telecommunications begins in 1935, the height of the great depression . . . . The company got its start with a new innovation called the audiometer, an electronic device designed to test hearing.").

[2] *High Fidelity Audio Devices Boost Capitol Diskery Sales*, BILLBOARD MAGAZINE at 12 (August 8, 1950) (describing Audio Development Company's amplifiers).

[3] David Beal, *Seeing the Light; ADC Telecommunications Has Grown From Making Telephone Jacks And Plugs Into A Force For The Global Fiber-Optic Future*, ST. PAUL PIONEER PRESS at E1 (December 25, 1995).

[4] George Lawton, *Fiber Optic Architecture Evolution Evident at Cable-TV Exhibition*, LIGHTWAVE MAGAZINE (August 1, 1995) ("Cable-Tec Expo's exhibition area featured new fiber-optic products and technologies for the optical-fiber and cable-TV industries. For example, Minneapolis-based ADC Telecommunications Inc.")

[5] *HTC Buys Patents from ADC Telecommunications for $75 million*, THE NATIONAL LAW REVIEW (April 19, 2011), *available at*: https://www.natlawreview.com/article/htc-buys-patents-

> Apple Inc. may face a difficult task invalidating two HTC Corp. patents for data transmission in wireless devices, a U.S. Trade Judge said at a trial that could lead to import bans on the newest iPad and the next version of the iPhone. . . In this case, though, HTC acquired the patents at issue in April 2011, around the same time it began selling its first LTE phone, the Thunderbolt. ***The patents are part of a portfolio HTC bought for $75 million from ADC Telecommunications Inc.*** [Judge] Pender told McKeon. "They are a property right."

Susan Decker, *HTC Patents Challenged by Apple Probably Valid, Judge Says*, BLOOMBERG NEWS (September 7, 2012) (emphasis added).

5. HTC's assertion of two patents acquired from ADC Telecommunications was described by commentators as forcing Apple to the negotiating table following a series of lawsuits between Apple and HTC:

> A separate case before the ITC may have ***forced Mr. Cook to the negotiating table*** after a judge at the agency said Apple would be likely to face difficulty getting a series of HTC patents invalidated. ***HTC bought those patents, which covered technology used in LTE high-speed wireless devices, from ADC Telecommunications for US $75 million***. "The settlement is a big surprise and is likely due to HTC's LTE patents, which is bought from ADC last year, as Apple's LTE patents are relatively weak," said Jeff Pu, an analyst from Fubon Financial Holding Co.

*Apple Settles HTC Patent Suits, Signaling Shift from Jobs' War Plan*, FINANCIAL POST / BLOOMBERG NEWS (November 12, 2012) (emphasis added).

6. ADC Telecommunication's revolutionary products included Homeworx Hybrid Fiber/Coax Access Platform ("ADC Homeworx").[6] ADC Homeworx was an integrated broadband transport system that could deliver video, telephony, data, and other services over a network of fiber optic and coaxial cables.[7] The ADC Homeworx network utilized fiber-optic and radio

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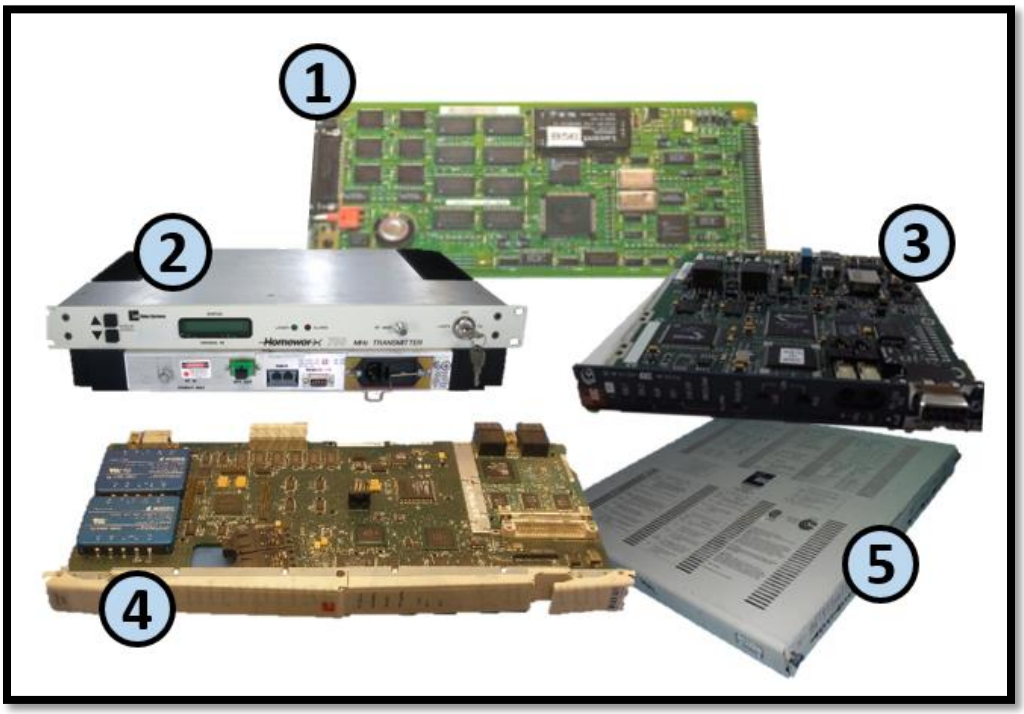
adc-telecommunications-75-million ("HTC, the Taiwan based smartphone manufacturer, has bought a portfolio of 82 patents and 14 pending applications related to mobile technology from US based ADC Telecommunications.").

[6] Sue Boyle, *Cable-Telephony Platform,* LIGHTWAVE MAGAZINE Vol. 17; No. 16 at 185 (September 1, 2000) ("The Homeworx cable-telephony system adds new features to the carrier-class hybrid fiber/coaxial telephony platform. The system offers improvements in flexibility, manageability, and robustness.").

[7] *Homeworx HFC Access Platform Outdoor ISU-32 Integrated Services Unit Installation Manual,* ADC Telecommunications Manual at 1-1 (July 1999).

frequency transmission technologies for transporting various services over a network.[8] ADC Telecommunications' groundbreaking products also included: the Soneplex Platform, CityCell, Cellworx STN Service, the EZT1 Voice Multiplexer, FOLENS (Fiber Optic Local Exchange Network System), and the DS3 Fiber Loop Converter. [9]




ANNOTATED GRAPHIC OF SELECTED ADC TELECOMMUNICATIONS PRODUCTS (numbered annotations showing: (1) ADC Soneplex SPX MPU Board MC68302; (2) ADC Homeworx 750MHz XMTR; (3) ADC HiGain HDSL4 Remote Unit H4TUR402L53; (4) ADC Cellworx BA4IKKLBAA; and (5) ADC Telecommunications EZT1 Access Multiplexer).

[8] *ADC AT&T Bis Team for Cable Telephony*, CABLE WORLD MAGAZINE Vol. 11 at 28 (May 31, 1999) ("The company's Homeworx cable telephony platform has the largest capacity in the fledgling 6 MHz bandwidth channel compared to conventional telephone carriers.").

[9] *Modems, Test Gear, Return Path Hot at Expo*, CED MAGAZINE (June 30, 1997), *available at:* https://www.cedmagazine.com/article/1997/06/modems-test-gear-return-path-hot-expo ("ADC Telecommunications introduced a new forward path receiver that extends performance to 860 MHz for cable TV and telephony applications.").

7. By 1999, ADC Telecommunications had almost 10,000 employees and annual sales of 1.5 billion dollars. Although ADC Telecommunications was a leading innovator in its field, it was a mid-sized company in a market dominated by multinational corporations.[10]

8. A 1999 New York Times article on the telecommunication industry foreshadowed the difficulties that ADC Telecommunications would face when competing against much large competitors who were able to use their market power to dominate the market at the expense of smaller players:

> Cisco's is not the only approach in the M.M.D.S. broad-band data market, however. The company's wireless competitors will include Spike Technologies, ADC Telecommunications and Adaptive Broadband. But ***Cisco's prominence as an Internet technology vendor, along with the powerful alliance it has built, could give the company an inside edge,*** some analysts said.

John Markoff, *Cisco to Offer More Details on Wireless Technology,* N.Y. TIMES a C-1 (November 29, 1999) (emphasis added).

9. In 2015, ADC Telecommunications (including its foundational intellectual property) were acquired by CommScope, Inc. ("CommScope"). CommScope, a spin-off of General Instrument Corporation, manufactures optical fiber cabling, multiplexers, and telecommunications antennas.

10. To facilitate the licensing of ADC Telecommunications' technology, CommScope assigned 73 patents and patent applications covering ADC Telecommunications' pioneering innovations relating to electronic circuits for timing and network traffic management to DIFF Scale Operation Research. DIFF Scale Operation Research protects and licenses ADC Telecommunications' inventions, which are widely adopted by leading technology companies.

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[10] Barnaby J. Feder, *Optical Fiber (Almost at Home),* N.Y. TIMES at F-6 (March 24, 1991) ("AT&T's competitors range from giants like Alcatel of France and Fujitsu of Japan to mid-sized companies like ADC Telecommunications Inc.").

11. Highlighting the importance of the patents-in-suit is the fact that the patents-in-suit have been cited by over 600 U.S. Patents and Patent Applications by a wide variety of the largest companies operating in the field. For example, the patents-in-suit have been cited by companies such as:

- International Business Machines Corporation[11]
- Apple, Inc.[12]
- Intel Corporation[13]
- Broadcom Corporation[14]
- Microsoft Corporation[15]
- Sony Corporation[16]
- Cisco Systems, Inc.[17]
- Hewlett-Packard Enterprise Company[18]
- ***Huawei Technologies Co., Ltd***.[19]
- Alcatel-Lucent S.A.[20]
- Fujitsu Ltd.[21]
- Panasonic Corporation[22]
- Telefonaktiebolaget L.M. Ericsson[23]
- NEC Corporation[24]

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[11] *See, e.g.*, U.S. Patent Nos. 7,894,478; 8,270,296; 8,559,460; 7,398,326; 7,827,317; 7,321,648; and 7,746,777.

[12] *See, e.g.*, U.S. Patent Nos. 9,026,680; 7,457,302; and 8,275,910.

[13] *See, e.g.*, U.S. Patent Nos. 7,248,246; 7046675; 7,263,557; 7,903,560; 8,233,506; 7,248,246; 6,507,915; 6,996,632; 7,346,099; and 7,673,073.

[14] *See, e.g.*, U.S. Patent Nos. 7,161,935; 7,203,227; 7,436,849; 7,724,661; 8,401,025; 8,411,705; 8,462,819; and 9,544,638.

[15] *See, e.g.*, U.S. Patent Nos. 7,526,677; 7,533,407; 7,793,096; 7,827,545; and 9,225,684.

[16] *See, e.g.*, U.S. Patent No. 8,200,873.

[17] *See, e.g.*, U.S. Patent Nos. 7,023,883; 7,523,185; 7,631,055; 7,653,924; 7,751,412; 8,144,591; 8,289,873; 8,379,648; and 8,811,281.

[18] *See, e.g.*, U.S. Patent Nos. 7,103,654; 7,187,674; 7,266,598; and 7,478,260.

[19] *See, e.g.*, U.S. Patent Nos. 7,664,051 and 7,916,758.

[20] *See, e.g.*, U.S. Patent Nos. 6,798,741; 6,895,004; 7,209,530; 7,525,913; 7,536,716; 7,583,689; 7,602,701; and 8,379,509.

[21] *See, e.g.*, U.S. Patent Nos. 6,647,012; 7,330,057; 7,450,505; 7,469,298; and 7,664,217.

[22] *See, e.g.*, U.S. Patent Nos. 8,648,632 and 7,457,979.

[23] *See, e.g.*, U.S. Patent Nos. 8,780,695 and 7,215,664.

[24] *See, e.g.*, U.S. Patent Nos. 6,218,875; 6,707,823; 6,810,497; 6,885,676; and 7,486,663.

- Marvell Technology Group, Limited[25]

## THE PARTIES

### DIFF SCALE OPERATION RESEARCH, LLC

12. DIFF Scale Operation Research, LLC ("DIFF Scale Operation Research") is a limited liability company organized under the laws of Delaware. DIFF Scale Operation Research is committed to advancing the current state of electronic circuitry and network infrastructure.

13. Brooks Borchers, a former leader of research and development divisions at Boston Scientific Corporation, is the president and owner of DIFF Scale Operation Research, LLC.

14. In an effort to obtain compensation for ADC Telecommunications' pioneering work in the fields of semiconductors, electronic circuitry, and network infrastructure, CommScope assigned the following patents and patent application to DIFF Scale Operation Research: U.S. Patents and Application Nos. 5,986,486; 6,008,734; 6,157,646; 6,216,166; 6,233,221; 6,363,073; 6,407,983; 6,433,988; 6,664,827; 6,721,328; 6,757,247; 6,847,609; 6,859,430; 6,940,810; 6,959,006; 6,980,565; 6,990,110; 7,106758; 7,170,894; 7,239,627; 7,881,413; 8,121,455; US20010000071A1; US20020150108A1; US20020163886A1; US20020176411A1; US20020180498A1; US20020190764A1; US20030063625A1; US20030118033A1; US20070019686A1; US20100061686A1; US20100150515A1 and International Patents and Application Nos. AT519138T; AU199914551A; AU199923274A; AU199923353A; AU200134402A; AU2002309562A1; CA2442738A1; CA2447983A1; CA2447983C; CN1278969A; CN1289489A; CN1291414A; DE102007010863A1; DE102007010863B4; DE102007032186A1; DE202007008151U1; DK2132589T3; EP1031185A1; EP1050125A1; EP1057361A1; EP1386450A2; EP1386450A4; EP2132589A1; EP2132589B1; ES2368361T3;

[25] *See, e.g.*, U.S. Patent Nos. 7,733,588; 7,737,793; and 7,944,313.

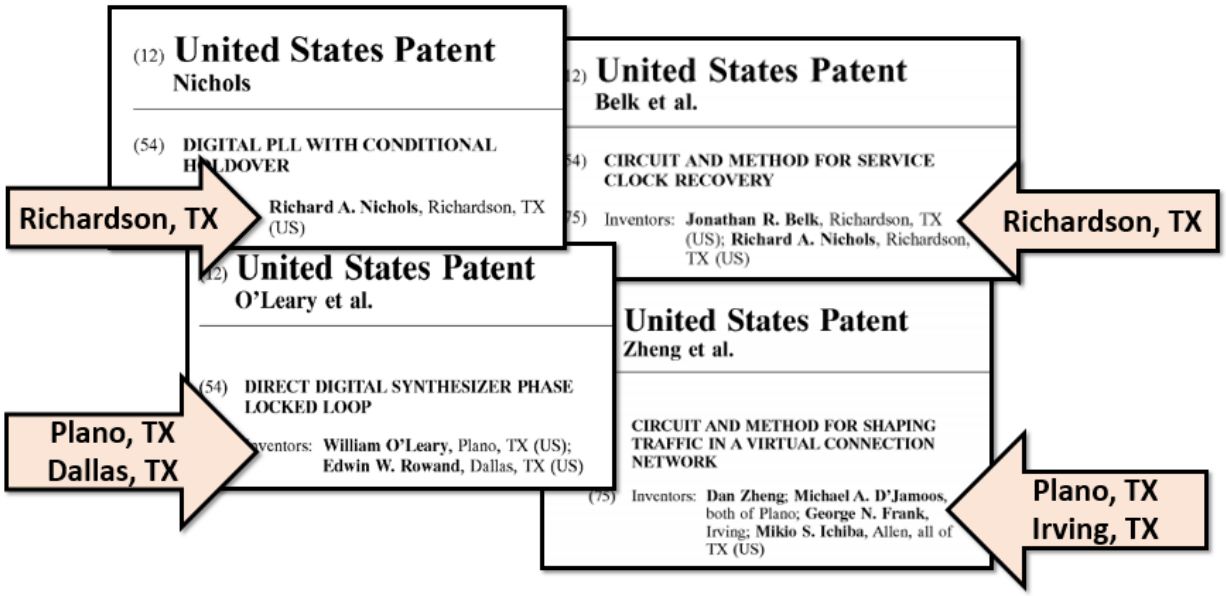
JP03811007B2; JP2001523059A; JP2002502146A; JP2002504793A; JP3811007B2; WO1999025066A1; WO1999038285A1; WO1999043184A1; WO2001037468A2; WO2001037468A3; WO2002084927A2; WO2002084927A3; WO2002101959A1; WO2008104282A1; WO2008104284A1.[26]

15. DIFF Scale Operation Research pursues the reasonable royalties owed for Huawei's use of ADC Telecommunications' and CommScope's groundbreaking technology both here in the United States and throughout the world.

16. CommScope maintains 79,950 square feet of office space at 2601 Telecom Pkwy, Richardson, Texas. Over 200 CommScope employees are employed at its Richardson, Texas location. CommScope maintains off-site document storage at its Richardson, Texas office where hard-copy documents are stored, at least some of which are relevant to this case. CommScope also maintains a datacenter located in Richardson, Texas, where at least some information and software relating to the patents-in-suit in this action are stored. In addition, CommScope maintains a Wide Band Multimode Fiber testing facility in Richardson, Texas.

17. ADC Telecommunications had a significant presence in Richardson, Texas and many of the inventions disclosed in the ADC Telecommunications patent portfolio were made at its Richardson location. On information and belief, many of the named inventors of the ADC Telecommunications patent portfolio continue to be located in and in close proximity to the Eastern District of Texas.

[26] The patents were assigned to DIFF Scale Operation Research by CommScope DSL Systems, LLC and CommScope Technologies, LLC.




U.S. PATENT NOS. 7,881,413; 6,664,827; 7,106,758; 6,407,983 (annotations added) (showing the named inventors located in and in close proximity to the Eastern District of Texas).

**HUAWEI TECHNOLOGIES CO., LTD.**

18. On information and belief, Huawei Technologies Co., Ltd. is a Chinese corporation with its principal place of business at Bantian Longgang District, Shenzhen, People's Republic of China.

19. On information and belief, Huawei Technologies Co., Ltd. has previously asserted patents in the Eastern District of Texas. *See, e.g., Huawei Technologies Co., Ltd. V. T-Mobile US, Inc., et al.*, Case No. 2:16-cv-00052 (E.D. Tex. Jan. 15, 2016).

**HUAWEI TECHNOLOGIES USA, INC.**

20. On information and belief, Huawei Technologies USA, Inc. is a Texas corporation with a principal place of business at 5700 Tennyson Parkway, Suite 600, Plano, Texas 75024. Huawei Technologies USA, Inc. can be served through its registered agent for service of process, CT Corporation System, 1999 Bryan Street, Suite 900, Dallas, Texas 75201.

## JURISDICTION AND VENUE

21. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has exclusive subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338(a).

22. Upon information and belief, this Court has personal jurisdiction over Huawei in this action because Huawei has committed acts within the Eastern District of Texas giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Huawei would not offend traditional notions of fair play and substantial justice. Defendants Huawei, directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the patents-in-suit. Moreover, Huawei is registered to do business in the State of Texas, has offices and facilities in the State of Texas, and actively directs its activities to customers located in the State of Texas.

23. Venue is proper in this district under 28 U.S.C. §§ 1391(b)-(d) and 1400(b). Huawei is registered to do business in the State of Texas, has a permanent and established place of business in the Eastern District of Texas, and upon information and belief, has transacted business in the Eastern District of Texas and has committed acts of direct and indirect infringement in the Eastern District of Texas.

## ADC TELECOMMUNICATIONS LANDMARK SEMICONDUCTOR AND NETWORKING TECHNOLOGIES

24. In 1935, ADC Telecommunications, then known as the Audio Development Company was founded in Minneapolis, Minnesota by two Bell Laboratory engineers to create custom transformers and amplifiers for the radio broadcast industry. In 1941, while participating

in a project to develop a sophisticated audio system for Coffman Union at the University of Minnesota, ADC Telecommunications began to produce jacks, plugs, patch cords, and jack fields, which would be cornerstones for ADC Telecommunications' later entry into telecommunications equipment.[27]

The Billboard

**High-Fidelity Audio Devices Boost Capitol Diskery Sales**

WASHINGTON, July 29. — High fidelity listening equipment to spur disk sales and please the customers is fast becoming a byword in retail diskeries here, with considerable credit for the trend going to a local firm, the Shrader Manufacturing Company, which specializes in high-fidelity installations. The Shrader company is doing a land-office business not only in store installations but in even greater volume in high fidelity custom sets for homes, a two-way course of operation which, as one enthusiastic dealer has commented, "has been literally filling the Washington air with good music and filling the record shops with good customers."

With customers showing more and more discrimination in choosing recordings ever since the battle of the disk speeds, disk dealers figure that by using high-fidelity equipment in their listening booths they are satisfying a natural trade need. They point out that results of high-fidelity gear are being shown not only in volume of improved high-fidelity recordings.

Among numerous retail diskeries here equipped by Shrader with high-fidelity gear are the Super Music Company, which has three outlets in the city; the Disc Shop, the Hollywood Music Shop and the John Learmont record and book store. The Super Music Company group and the Disc Shop have recently undergone expansion (*The Billboard*, July 22) and are completely rigged with high-fidelity equipment. The Disc Shop alone has half a dozen listening booths, each equipped with individual high-fidelity amplifiers and speakers. The Super Music group has a total of nearly 70 disk listening posts rigged to high-fidelity equipment. Particularly popular with dealers who have installed high-fidelity gear are the Livingston tone arm, the Rek-O-Kut heavy transcription turntable, Audio Development Company (ADC) amplifiers and Altec 15-inch speakers.

High-fidelity gear is considered by

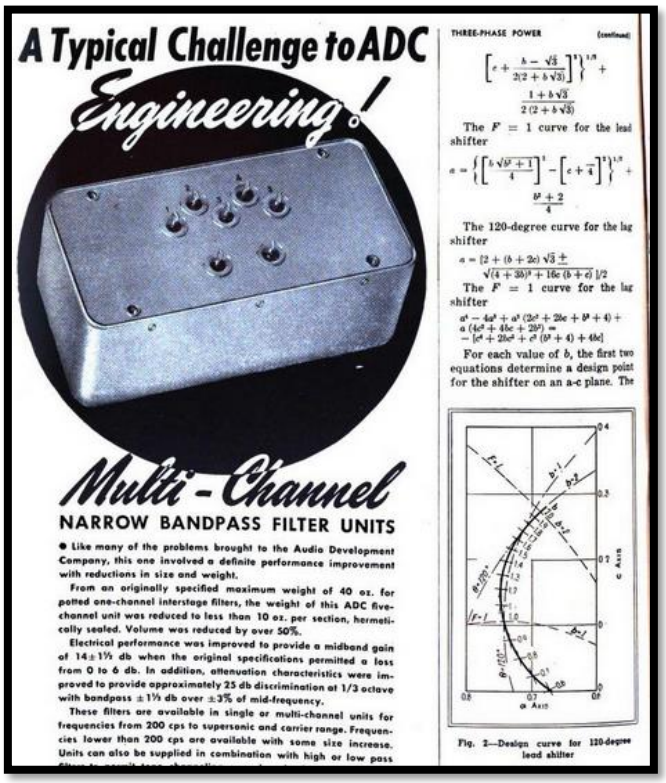
(See High-Fidelity Audio, page 38)

*High Fidelity Audio Devices Boost Capitol Diskery Sales*, BILLBOARD MAGAZINE at 12 (August 8, 1950) (describing Audio Development Company's amplifiers).

25. In 1961, ADC Telecommunications released the Bantam jack. This product was an amalgam of miniaturized components and became standard for telephone circuit access and patching.[28]

[27] James F. Mauk, INDUSTRIAL RESEARCH LABORATORIES OF THE UNITED STATES at 47 (1947) (listing the research activities of the Audio Development Company as "high temperature electronic transformers; miniaturization of electronic transformers; high frequency electrical wave filters, encapsulation techniques; epoxies").

[28] Steven Titch, *ADC Unveils Loop Product Strategy*, TELEPHONY at 9 (February 24, 1992).



A Typical Challenge to ADC Engineering!

Multi-Channel

NARROW BANDPASS FILTER UNITS

● Like many of the problems brought to the Audio Development Company, this one involved a definite performance improvement with reductions in size and weight.

From an originally specified maximum weight of 40 oz. for potted one-channel interstage filters, the weight of this ADC five-channel unit was reduced to less than 10 oz. per section, hermetically sealed. Volume was reduced by over 50%.

Electrical performance was improved to provide a midband gain of 14 ± 1½ db when the original specifications permitted a loss from 0 to 6 db. In addition, attenuation characteristics were improved to provide approximately 25 db discrimination at 1/3 octave with bandpass ±1½ db over ±3% of mid-frequency.

These filters are available in single or multi-channel units for frequencies from 200 cps to supersonic and carrier range. Frequencies lower than 200 cps are available with some size increase. Units can also be supplied in combination with high or low pass

THREE-PHASE POWER (continued)

The $F = 1$ curve for the lead shifter

The 120-degree curve for the lag shifter

The $F = 1$ curve for the lag shifter

For each value of $b$, the first two equations determine a design point for the shifter on an a-c plane. The

Fig. 2—Design curve for 120-degree lead shifter

*A Typical Challenge To ADC Engineering*, ELECTRONICS MAGAZINE Vol. 18 at 288 (August 1945) (describing one of the early innovations of ADC Telecommunications).

26. In the 1960s, ADC Telecommunications began an ongoing partnership with NASA's space missions, designing and manufacturing sensors for the Columbia space shuttle.

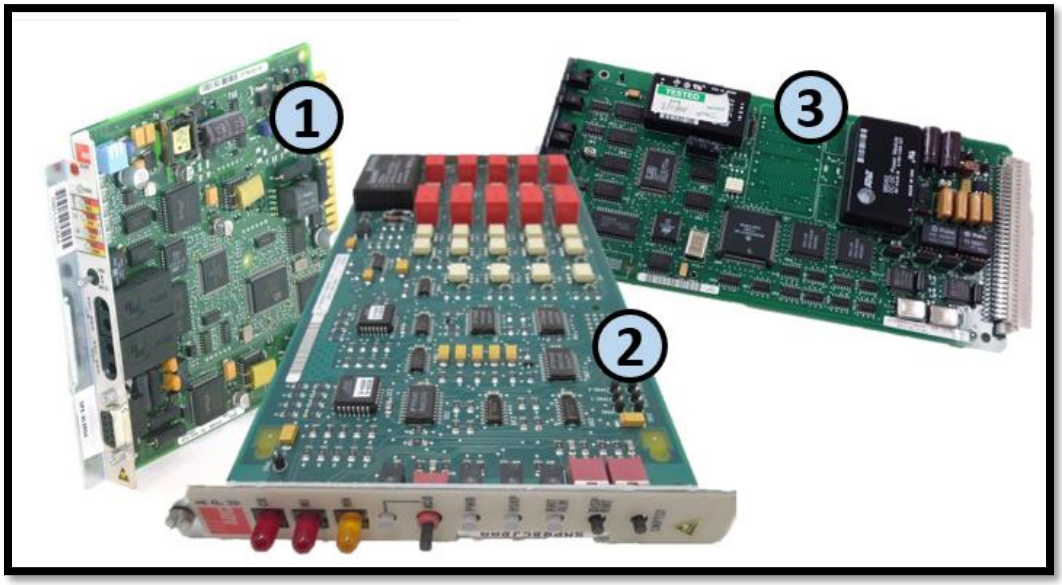
power supply board. The transceivers used are the CAF model manufactured by ADC Telecommunications, Inc.. The transceiver use bidirectional, full-duplex signal transmission over a single optic fiber. The transceiver is a self-contained, circuit-board-mountable device that contains the transmitting LED, the receiving photodetector, and the beam splitter. The transceivers are a matched pair which utilize two different light frequencies for receiving and transmitting. This configuration allows for full-duplex and bidirectional operation over a single fiber optic line. The optic fiber connects to the transceivers with SMA-type connectors.

R. L. Glassell et al., *Custom Electronic Subsystems For The Laboratory Telerobotic Manipulator*, PROCEEDINGS OF THE FOURTH ANS TOPICAL MEETING ON ROBOTICS AND REMOTE SYSTEMS at 151 (1991) (describing the work ADC Telecommunications was doing for NASA).

27. The 1970s and 1980s ushered in technological advancement in all areas of telecommunications and data processing. Public and private computer use increased, and

telecommunications evolved into the computer age, with telephonic digital transmission and the expansion of data communications. As a leading innovator in these fields, ADC Telecommunications grew dramatically. ADC Telecommunications entered the video services delivery market and was a leading supplier of fiber-optic video transmission equipment for cable operators.[29]

28. In the 1990's ADC Telecommunications utilized its fiber-optics expertise to develop a local loop system with the goal of providing economical fiber directly to private homes. ADC Telecommunications also created Networx, a novel transmission platform that integrated cable management and private networking products, using synchronous optical network and the asynchronous transfer mode (ATM). The cornerstone of Networx was Sonoplex, a multi-rate, multimedia system that brought fiber to the customer's work or residence site, while making use of existing copper lines.




ANNOTATED GRAPHIC OF SELECTED ADC SONOPLEX TELECOMMUNICATIONS PRODUCTS (numbered annotations showing: (1) SPX-HLXRG4 Sonoplex HDSL Module; (2) ADC SPX-APU0B1 SONEPLEX ALM Processor Module; and (3) ADC SPX-RLX1B1 CARD.).

[29] Carol Wilson, *ADC Launches Fiber-Coax Platform*, TELEPHONY AT 11 (May 24, 1993).

29. In the 1990s, ADC Telecommunications partnered with South Central Bell, Mississippi Educational Television, Northern Telecom, IBM, and Apple Computer to create Fibernet, a network linking students at four high schools in Clarksville, Corinth, West Point, and Philadelphia, Mississippi, with teachers at Mississippi State University, Mississippi University for Women, and Mississippi School for Mathematics and Science to create "electronic classrooms."

30. ADC Telecommunications became an "early leader" in the asynchronous transfer mode (ATM) market, developing some of the first ATM switches. The ADC Telecommunications ATM switch enabled the handling the massive flows of simultaneous high-speed digital information that the industry projected would be generated during the latter half of the 1990s and into the 21st century, arising from the blending of the communications, computing, and entertainment industries. ADC Telecommunications also landed a coup in March 1994 when Ameritech chose ADC to supply equipment for its fiber-optic video system. This $4.4 billion project would bring 70 channels of analog television and 40 channels of digital video to customers, with unlimited program choices and interactive, customer-controllable programming. By 1999, ADC Telecommunications employed 9,700 people and was selling $1.5 billion dollars in communications equipment.

## THE ASSERTED PATENTS

### U.S. PATENT NO. 7,881,413

31. U.S. Patent No. 7,881,413 (the "'413 patent") entitled, *Digital PLL With Conditional Holdover*, was filed on March 1, 2002, and claims priority to March 2, 2001. The '413 patent is subject to a 35 U.S.C. § 154(b) term extension of 2,127 days. DIFF Scale Operation Research is the owner by assignment of the '413 patent. A true and correct copy of the '411 patent is attached hereto as Exhibit A.

32. The ‘413 patent teaches novel phase locked loops (PLL) that provide for conditional holdover that is especially suited for use in communications networks.

33. The ‘413 patent and its underlying patent application have been cited by 24 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the ‘413 patent and its underlying patent application as relevant prior art:

- Fujitsu Ltd.
- Infineon Technologies Ag
- Mediatek Inc.
- Schweitzer Engineering Laboratories, Inc.
- Silicon Laboratories Inc
- Sony Corporation
- Thomas & Betts International, LLC
- National Semiconductor Corporation
- L3 Communications Integrated Systems, L.P.
- Xilinx, Inc.
- Nortel Networks Limited
- Lattice Semiconductor
- Emerson Electric Co., Ltd.
- Furuno Electric Co., Ltd.
- Panasonic Corporation
- ***Huawei Technologies Co., Ltd.***

**U.S. PATENT NO. 6,664,827**

34. U.S. Patent No. 6,664,827 (the “‘827 patent”) entitled, *Direct Digital Synthesizer Phase Locked Loop,* was filed on March 1, 2002, and claims priority to March 2, 2001. DIFF Scale Operation Research is the owner by assignment of the ‘827 patent. A true and correct copy of the ‘827 patent is attached hereto as Exhibit B.

35. The ‘827 patent discloses phase locked loops for establishing a timing signal for signal communication synchronization. The various embodiments of the invention make use of phase locked loops adapted to filter and store data indicative of the control signal applied to an oscillator. Such phase locked loops permit suppression of tracking in the event of a step change

in the phase difference between the reference clock signal and the feedback signal in the phase locked loop. Such phase locked loops further facilitate compensation for drift of the oscillator.

36. The ‘827 patent teaches, in one embodiment, a phase locked loop that includes a digital phase comparator having a first input for receiving a reference clock signal, a second input for receiving a feedback signal, and an output for providing an error signal; a digital loop filter having an input for receiving the error signal and an output for providing a control signal; a numerically-controlled oscillator having an input for receiving the control signal and an output for providing a timing signal, wherein the feedback signal is derived from the timing signal.

37. The ‘827 patent teaches detecting a step change in a phase relationship between the reference clock signal and the feedback signal, and to recenter the digital phase comparator if a step change is detected.

38. The ‘827 patent teaches the sampling of data from a low-pass filter indicative of an average control signal and comparing the average control signal to a threshold limit. The ‘827 patent describes trimming the oscillator if the average control signal is outside the threshold limit.

39. The ‘827 patent further teaches monitoring a phase comparator for a step change in the phase difference between the reference clock signal and the feedback signal; and recentering the phase comparator if a step change in the phase difference between the reference clock signal and the feedback signal is detected.

40. The ‘827 patent and its underlying patent application have been cited by 48 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the ‘827 patent and its underlying patent application as relevant prior art:

- Advantest Corporation
- Agilent Technologies Inc.,

- Air Products and Chemicals, Inc.
- Broadcom Corporation
- Datang Group
- Freescale Semiconductor, Inc.
- NXP Semiconductors
- Infineon Technologies AG
- International Business Machines Corporation
- Marvell International Ltd.
- Cavium
- Metrotech Corporation
- Nvidia Corporation
- Siemens Aktiengesellschaft
- Standard Microsystems Corporation
- Western Digital Technologies, Inc.
- Hewlett-Packard Development Company, L.P.
- Rambus, Inc.
- Panasonic Corporation
- National Semiconductor Corporation
- Alcatel
- Lightlab Imaging, Inc.
- Matsushita Electric Industrial Co., Ltd.
- National Aeronautics and Space Administration ("NASA")
- Advanced Micro Devices, Inc.
- Nihon Dempa Kogyo Co., Ltd.

**U.S. PATENT NO. 6,407,983**

41. U.S. Patent No. 6,407,983 (the "'983 patent") entitled, *Circuit and Method for Shaping Traffic in a Virtual Connection Network*, was filed on February 20, 1998. DIFF Scale Operation Research is the owner of all right, title, and interest in the '983 patent. A true and correct copy of the '983 patent is attached hereto as Exhibit C.

42. The '983 patent claims specific methods and systems for delivering data packets from a traffic source to a virtual connection at a uniform rate using a traffic shaper. For example, one or more of the '983 patent claims describe a system where a buffer receives packets from a traffic source (e.g., a server on a computer network that originates data packets). The claimed

system utilizes a counter that indicates the beginning of each of a number of timeslots over a selectable time period. Further, the claimed system contains a request generator that creates request signals that request timeslots for transmitting data out of a buffer. The requests are distributed so that a desired data rate for the traffic source is established.

43. The ‘983 patent teaches a method and system for an improved traffic shaper. At the time the inventions disclosed in the ‘983 patent were conceived “conventional[] telecommunications services [had] been provided to subscribers using dedicated channels.” ‘983 patent, col. 1:11-12.

44. In the late 1990’s, conventional traffic shaping technology could not selectively allocate timeslots for data transmission in a measurement window. The ‘983 patent teaches specific solutions to the problem apparent in the technology at the time. For example, the ’983 patent teaches the use of a request generator that generates requests during a specific time window. The request generator attempts to evenly distribute the requests over the duration of the window.

45. The ‘983 patent discloses additional improvements to the functioning of traffic shapers by teaching the delivery of data packets from at least one traffic source to a virtual connection network at a substantially uniform rate.

46. The ‘983 patent further teaches the use of generating requests for timeslots for data transmission according to a stored pattern based on a selected data rate.

47. Another insight for improving the performance of traffic shaping systems described by the ‘983 patent is to use a counter which can generate pulses that indicate the beginning of each timeslot in a measurement window.

48. The inventions taught in the ‘983 patent achieve improvements in traffic shaping systems by creating request signals that request timeslots for transmitting data out of the buffer.

Implementation of the system and methods disclosed in the '983 patent is directed to a specific improvement in computer technology - delivering data packets from at least one traffic source at a substantially uniform rate. Further, the claims of the '983 patent are directed to specific asserted improvements in computer capabilities. For example, the claims recite specific steps – a counter that indicates the beginning of each of a number of time slots over a selectable time period – that accomplish the desired result – delivering data packets at a substantially uniform rate.

49. The '983 patent claims a technical solution to a problem unique to computer systems: delivering data packets to a virtual connection.

50. The '983 patent family has been cited by 61 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '983 patent family as relevant prior art:

- Alcatel-Lucent S.A.
- AT&T, Inc.
- Broadcom Corporation
- End II End Communications, Inc.
- Intel Corporation
- InterDigital, Inc.
- International Business Machines Corporation
- ORBCOMM, Inc.
- PRO DESIGN Electronics GmbH
- Riverstone Networks, Inc.
- Verizon Communications, Inc.

**U.S. PATENT NO. 6,847,609**

51. U.S. Patent No. 6,847,609 ("the '609 patent") entitled, *Shared Management of Network Entity*, was filed on August 18, 1999, and claims priority to June 29, 1999. DIFF Scale Operation Research is the owner of all right, title, and interest in the '609 patent. A true and correct copy of the '609 patent is attached hereto as Exhibit D.

52. The ‘609 patent claims specific methods and systems for improved management of network entities at the point of demarcation that allows the service provider and enterprise flexibility in creating enterprise networks. The systems and methods claimed by the ‘609 patent include a network entity that is configurable to be jointly managed by at least two network management stations, *e.g.*, a network management station controlled by the enterprise and a network management station controlled by a service provider. Advantageously, this provides greater flexibility to service providers and enterprises in implementing an enterprise network.

53. The ‘609 patent teaches a method and system where a number of local area networks are each coupleable to at least one network element of a service provider network.

54. The ‘609 patent further teaches the use of a service delivery unit that allows management functions for a network to be divided or shared by the service provider and the enterprise network.

55. Another insight for improving the performance of enterprise networks described by the ‘609 patent is to have a network management terminal communicatively coupled to one network element of the service provider network such that the network management terminal is operable to view a configurable portion of data stored in memory.

56. Further, the ‘609 patent improves the performance of an enterprise network by facilitating management of selected aspects of a network element.

57. The ‘609 patent further discloses monitoring operation of a telecommunications network at a network entity.

58. Among the inventions disclosed in the ‘609 patent is bifurcating management of a network by having a network management station of an enterprise network view a first, configurable portion of the management data.

59. The inventions taught in the '609 patent achieve improvements in enterprise networks by having a network entity that is configurable to be jointly managed by at least two network management stations, e.g., a network management station controlled by the enterprise and a network management station controlled by a service provider. This provides greater flexibility to service providers and enterprises in implementing an enterprise network. Implementation of the system and methods disclosed in the '609 patent are directed to a specific improvement in computer technology – enterprise networks. Further, the claims of the '609 patent are directed to specific improvements in computer capabilities. For example, the claims recite specific steps – a network management terminal communicatively coupled to the at least one network element of the service provider network – that accomplish the desired result.

60. The '609 patent claims a technical solution to a problem unique to computer systems: improved management of network entities at the point of demarcation.

61. The '609 patent and its related patents have been cited by 61 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '609 patent family as relevant prior art:

- Aerohive Networks, Inc.
- Alcatel-Lucent S.A.
- Allied Telesis K.K.
- AT&T, Inc.
- Avaya, Inc.
- Ciena Corporation
- Cisco Systems, Inc.
- International Business Machines Corporation
- Microsoft Corporation
- Narad Networks, Inc.
- Packeteer, Inc.
- SBCX Properties, L.P.
- Sun Microsystems, Inc.
- Telecom Italia S.p.A.

**U.S. PATENT NO. 6,940,810**

62. U.S. Patent No. 6,940,810 ("the '810 patent") entitled, *Protection Switching of Virtual Connections at the Data Link Layer*, was filed on October 25, 2000, and claims priority to February 20, 1998. The '810 patent is subject to a 35 U.S.C. § 154(b) term extension of 875 days. DIFF Scale Operation Research is the owner of all right, title, and interest in the '810 patent. A true and correct copy of the '810 patent is attached hereto as Exhibit E.

63. The '810 patent claims specific methods and systems for protection switching in a network that uses virtual connections. The system includes first and second switch fabrics, unidirectional busses that provide a communication path between the first and second switch fabrics, and network elements that separately track the status of a number of virtual connections such that when an error is detected by one of the switch fabrics, the error is communicated to the other switch fabric.

64. The '810 patent teaches a method and system wherein the first and second switch fabrics of each network element are associated with a route.

65. The '810 patent further teaches the use of a first and second uni-directional bus that is used to communicate the change in state for a virtual connection.

66. Another insight for improving the performance of a network described by the '810 patent is to have a number of ring segments coupled between adjacent network elements to form first and second routes for transporting cells using virtual connections.

67. The '810 patent further discloses at least two uni-directional busses coupled between two switch fabrics.

68. Among the inventions disclosed in the ‘810 patent is a ring network that includes two routes for transporting cells using a virtual connection. Further, for each virtual connection, one route is the working route and the other route is the protection route.

69. The inventions taught in the ‘810 patent achieve improvements in computer network systems by using virtual connections to communicate between two switch fabrics. Implementation of the system and methods disclosed in the ‘810 patent is directed to a specific improvement in computer technology – protection switching in a network that uses virtual connections. Further, the claims of the ‘810 patent are directed to specific asserted improvements in computer networking capabilities. For example, the claims recite specific steps – first and second unidirectional busses that provide a communication path between the first and second switch fabrics – that accomplish the desired result.

70. The ‘810 patent claims a technical solution to a problem unique to computer systems: network survivability following errors.

71. The ‘810 patent and its related patents have been cited by 17 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the ‘810 patent family as relevant prior art:

- Brocade Communications Systems, Inc. (now part of Broadcom Limited)
- Foundry Networks LLC (now part of Broadcom Limited)
- Ciena Corporation
- Audiocodes Texas, Inc.
- Hewlett-Packard Development Company, L.P.
- Positron Networks PNI, Inc.
- Samsung Electronics Co., Ltd.
- Symantec Corporation
- Tekelec, Inc. (now part of Oracle Corporation)
- Telefonaktiebolaget LM Ericsson
- Broadcom Limited

**U.S. PATENT NO. 6,990,110**

72. U.S. Patent No. 6,990,110 ("the '110 patent") entitled, *Automatic Permanent Virtual Circuit Connection Activation for Connection Oriented Networks*, was filed on April 12, 2001. The '110 patent is subject to a 35 U.S.C. § 154(b) term extension of 530 days. DIFF Scale Operation Research is the owner of all right, title, and interest in the '110 patent. A true and correct copy of the '110 patent is attached hereto as Exhibit F.

73. The '110 patent claims specific methods and systems for improvements in end-to-end provisioning of communication systems. The system includes an access network, a central unit, and customer premises equipment. Further, the '110 patent describes a system wherein an automatic permanent virtual circuit connection is embedded within the central unit. The automatic permanent virtual circuit is enabled when the customer premises equipment is initialized and can create a translation connection between the customer premises equipment and the central unit.

74. The '110 patent teaches a method and system for automatic permanent virtual circuit connection activation.

75. The '110 patent further teaches the use of a central unit selectively coupled to the access network.

76. Another insight for improving the performance of a communications network described by the '110 patent is to have an automatic permanent virtual circuit connection activation function embedded in the central unit. And, when the customer premises equipment is initialized, a translation connection between the customer premises equipment and the central unit is created.

77. The '110 patent further discloses a central unit that recognizes at least one virtual circuit identifier of the customer premises equipment by receiving traffic from the customer premises equipment.

78. Among the inventions disclosed in the ‘110 patent is a system for automatically configuring a permanent virtual circuit in an asynchronous transfer mode network

79. The inventions taught in the ‘110 patent achieve improvements in end-to-end provisioning of communication networks by creating a translation connection between the customer premises equipment and the central unit. Implementation of the system and methods disclosed in the ‘110 patent is directed to a specific improvement in computer technology - end-to-end provisioning of communication systems. Further, the claims of the ‘110 patent are directed to specific asserted improvements in computer capabilities. For example, the claims recite specific steps – detecting initiation of communication at a user network interface between a first and a second network element and creating a translation connection between the first and second network elements – that accomplish the desired result.

80. The ‘110 patent claims a technical solution to a problem unique to computer systems: end-to-end provisioning of communication systems.

81. The ‘110 patent and its related patents have been cited by 34 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the ‘110 patent family as relevant prior art:

- Alcatel-Lucent S.A.
- AT&T, Inc.
- BellSouth Intellectual Property Corporation
- Brooktree Broadband Holding, Inc. (now part of Synaptics, Inc.)
- Cisco Systems, Inc.
- Fujitsu, Ltd.
- ***Huawei Technologies Co., Ltd.***
- Intel Corporation
- Nant Holdings IP, LLC
- NEC Corporation
- SBC Properties, L.P.
- Tellabs, Inc.
- Wireless LAN Systems Oy

**U.S. PATENT NO. 6,233,221**

82. U.S. Patent No. 6,233,221 ("the '221 patent") entitled, *System and Method for a Ring Network with Virtual Path Connections*, was filed on February 20, 1998. DIFF Scale Operation Research is the owner of all right, title, and interest in the '221 patent. A true and correct copy of the '221 patent is attached hereto as Exhibit G.

83. The '221 patent claims specific methods and systems for a virtual path ring network. The system includes an add/drop multiplexer and when the destination address corresponds to an endpoint that is not associated with the add/drop multiplexer the system and methods in '221 patent teach switching the packet back out onto the ring.

84. The '221 patent teaches a method and system for processing packets in an add/drop multiplexer.

85. The '221 patent further teaches the use of a first sub-network that includes a number of add/drop multiplexers coupled to form a ring including first and second routes for transmitting data around the network;

86. Another insight for improving the performance of a virtual path network described by the '221 patent is to have a first ring interconnection module that interconnects the first sub-network with one of the routes of the second sub-network.

87. The '221 patent further discloses the use of a sub-network in a virtual path network that includes a number of add/drop multiplexers coupled to form another ring network for transmitting data around a network.

88. Among the inventions disclosed in the '221 patent is a system for a virtual path network with two sub-networks that each include an add/drop multiplexer for transmitting data around the network.

89. The inventions taught in the ‘221 patent achieve improvements in a virtual path ring network. Implementation of the system and methods disclosed in the ‘221 patent is directed to a specific improvement in computer technology – a ring network with virtual connections that survives a single point of failure and can interconnect with other ring networks without interfering with the operation of the other ring networks. Further, the claims of the ‘221 patent are directed to specific asserted improvements in computer capabilities. For example, the claims recite specific steps – interconnection module that interconnects the first sub-network with the other route of the second sub-network – that accomplish the desired result.

90. The ‘221 patent claims a technical solution to a problem unique to computer systems: preventing a single point of failure from bringing down a network element and network.

91. The ‘221 patent and its related patents have been cited by 15 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the ‘221 patent family as relevant prior art:

- Beijing Kaihua Network Alliance Technology Co., Ltd
- Coriant Operations, Inc. (part of Tellabs, Inc.)
- Telefonaktiebolaget LM Ericsson
- Fujitsu, Ltd.
- Lucent Technologies, Inc.
- Micron Technology, Inc.
- NEC Corporation
- Nortel Networks Limited
- Siemens AG
- Texas Instruments, Inc.

**U.S. PATENT NO. 6,859,430**

92. U.S. Patent No. 6,859,430 (“the ‘430 patent”) entitled, *Protection Switching of Virtual Connections*, was filed on October 1, 1999, and claims priority to February 20, 1998. DIFF

Scale Operation Research is the owner of all right, title, and interest in the '430 patent. A true and correct copy of the '430 patent is attached hereto as Exhibit H.

93. The '430 patent claims specific methods and systems for the protection of virtual connections in a network.

94. The inventions taught in the '430 patent achieve improvements in networking systems. Implementation of the system and methods disclosed in the '430 patent is directed to a specific improvement in computer technology – virtual connection switching. Further, the claims of the '430 patent are directed to specific asserted improvements in computer capabilities

95. The '430 patent and its related patents have been cited by 16 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '430 patent family as relevant prior art:

- Adtran, Inc.
- Ciena Corporation
- Hewlett-Packard Development Company, L.P.
- Infinera Corporation
- Mitsubishi Denki Kabushiki Kaisha
- Nortel Networks, Ltd.
- Alcatel-Lucent S.A.

## COUNT I
## INFRINGEMENT OF U.S. PATENT NO. 7,881,413

96. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

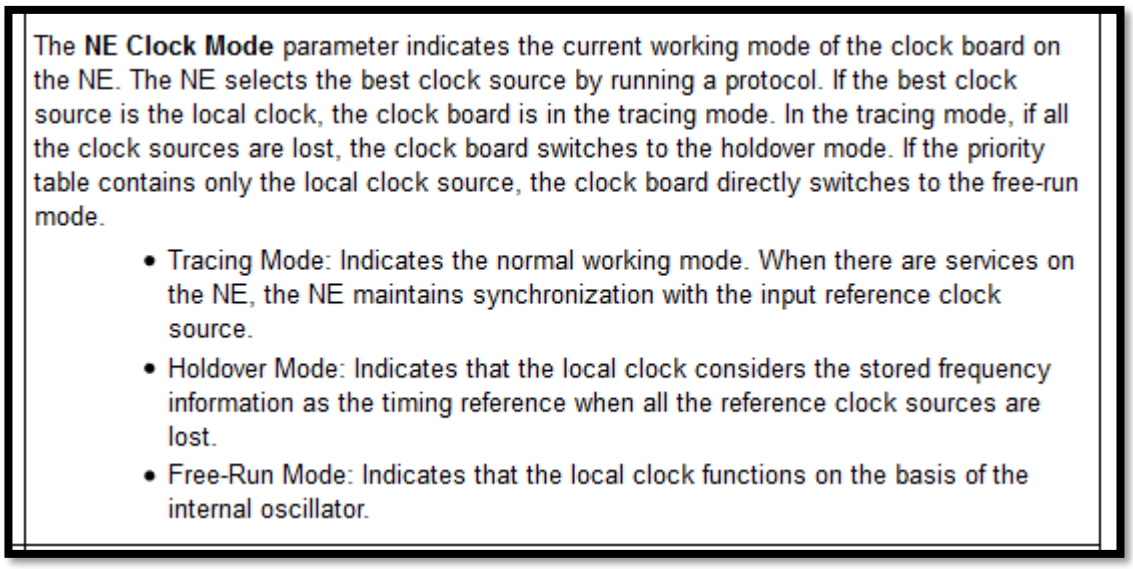
97. Huawei designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for generating a timing signal in a phase locked loop.

98. Huawei designs, makes, sells, offers to sell, imports, and/or uses products incorporating timing devices, including: Huawei NE05E, Huawei NE08E, Huawei NE40E, Huawei NE80E, OptiX PTN 7900 Transmission Systems, OptiX PTN 3900 Transmission

Systems, OptiX PTN 1900 Transmission Systems, OptiX PTN 900 Transmission Systems, OptiX RTN 900 Series, OptiX OSN 3800 Series, and OptiX OSN 3500 Series (collectively, the "Huawei '413 Product(s)") (the "Huawei '413 Product(s)").

99. On information and belief, one or more Huawei subsidiaries and/or affiliates use the Huawei '413 Products in regular business operations.

100. On information and belief, one or more of the Huawei '413 Products include technology for generating a timing signal from a reference clock signal.

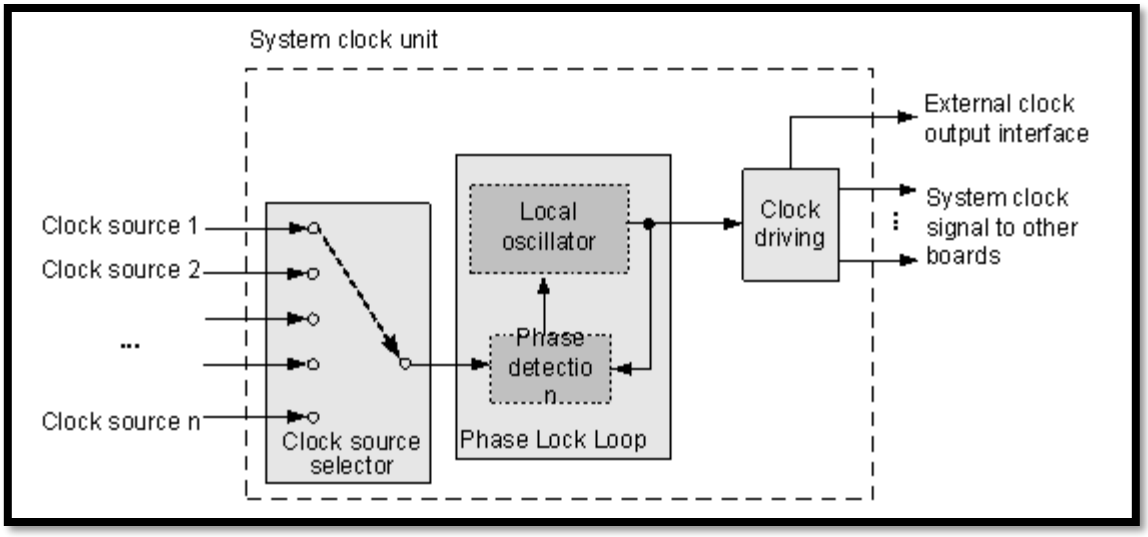


The **NE Clock Mode** parameter indicates the current working mode of the clock board on the NE. The NE selects the best clock source by running a protocol. If the best clock source is the local clock, the clock board is in the tracing mode. In the tracing mode, if all the clock sources are lost, the clock board switches to the holdover mode. If the priority table contains only the local clock source, the clock board directly switches to the free-run mode.

- Tracing Mode: Indicates the normal working mode. When there are services on the NE, the NE maintains synchronization with the input reference clock source.
- Holdover Mode: Indicates that the local clock considers the stored frequency information as the timing reference when all the reference clock sources are lost.
- Free-Run Mode: Indicates that the local clock functions on the basis of the internal oscillator.

OPTIX OSN 6800 INTELLIGENT OPTICAL TRANSPORT PLATFORM PRODUCT DOCUMENTATION, PRODUCT VERSION V100R011C00 (March 3, 2017) (shows the various NE Clock Modes supported by the Huawei devices).

101. On information and belief, one or more of the Huawei '413 Products contain a phase comparator.

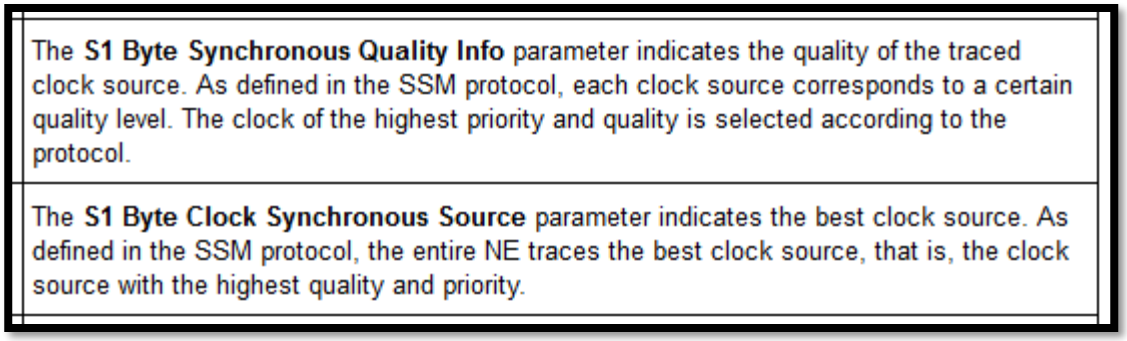



HUAWEI RTN 980L V100R010C00 PRODUCT DOCUMENTATION (September 15, 2017) (The above diagram show the principle block diagram of the system clock. "The discriminator compares the phases of the clock signals from the reference source and from the local oscillator and thus controls the output frequency of the oscillator according to the phase offset. The digital LLP adjusts the frequency of the local oscillator so that the output frequency of the oscillator is the same as the frequency of the reference clock source.").

102. On information and belief, one or more of the Huawei '413 Products contain a low-pass filter.

103. On information and belief, one or more of the Huawei '413 Products comprise an oscillator coupled in a feedback arrangement.

104. On information and belief, one or more of the Huawei '413 Products comprise a control system that generates an output signal where the phase of the output signal is related to the phase of an input signal.



The **S1 Byte Synchronous Quality Info** parameter indicates the quality of the traced clock source. As defined in the SSM protocol, each clock source corresponds to a certain quality level. The clock of the highest priority and quality is selected according to the protocol.

The **S1 Byte Clock Synchronous Source** parameter indicates the best clock source. As defined in the SSM protocol, the entire NE traces the best clock source, that is, the clock source with the highest quality and priority.

OPTIX OSN 6800 INTELLIGENT OPTICAL TRANSPORT PLATFORM PRODUCT DOCUMENTATION, PRODUCT VERSION V100R011C00 (March 3, 2017) ("The S1 Byte Synchronous Quality Info parameter indicates the quality of the traced clock source. As defined in the SSM protocol, each clock source corresponds to a certain quality level.").

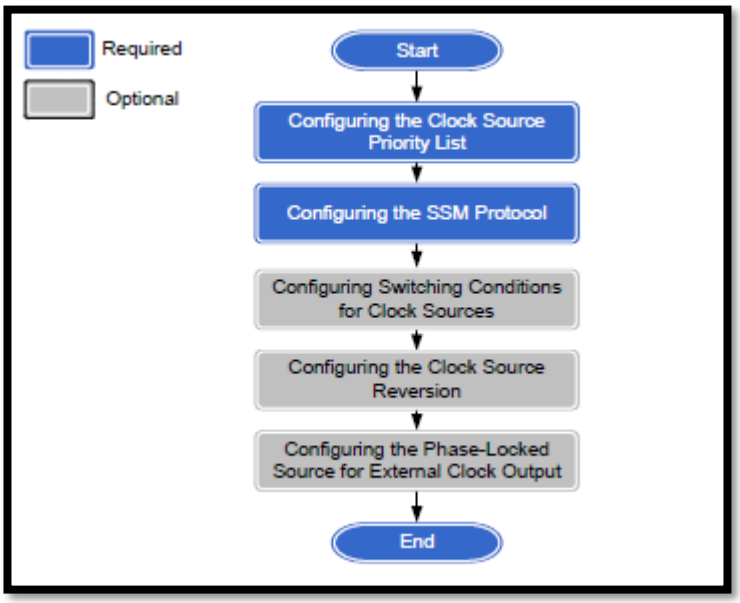
105. On information and belief, the Huawei '413 Products are available to businesses and individuals throughout the United States.

106. On information and belief, the Huawei '413 Products are provided to businesses and individuals located in the Eastern District of Texas.

107. On information and belief, Huawei has directly infringed and continues to directly infringe the '413 patent by, among other things, making, using, offering for sale, and/or selling technology for generating a timing signal in a phase locked loop, including but not limited to the Huawei '413 Products, which include infringing technology for generating a timing signal in a phase locked loop. Such products and/or services include, by way of example and without limitation, the Huawei '413 Products.

108. On information and belief, the Huawei '413 Products comprise a system for generating a timing signal from a reference clock signal in a phase locked loop.

109. On information and belief, the Huawei '413 Products include functionality for monitoring a status message received from a source of the reference clock signal indicative of a quality level of the reference clock signal.




OPTIX PTN 990 PACKET TRANSPORT PLATFORM OF PTN SERIES V100R008C00 CONFIGURATION GUIDE at 705 (August 31, 2017). (showing the configuration flow where the SSM protocol is enabled).

110. On information and belief, the Huawei '413 Products are a system containing functionality for placing the phase locked loop in a holdover condition if the quality level indicated by the status message is below a target level.

111. The Huawei '413 Products comprise a system for performing the elements in a proscribed order.

112. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Huawei '413 Products, Huawei has injured DIFF Scale Operation Research and is liable to the Plaintiff for directly infringing one or more claims of the '413 patent, including at least claim 21 pursuant to 35 U.S.C. § 271(a).

113. On information and belief, Huawei also indirectly infringes the '413 patent by actively inducing infringement under 35 USC § 271(b).

114. Huawei has had knowledge of the '413 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Huawei knew of the '413 patent and knew of its infringement, including by way of this lawsuit.

115. On information and belief, Huawei intended to induce patent infringement by third-party customers and users of the Huawei '413 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Huawei specifically intended and was aware that the normal and customary use of the accused products would infringe the '413 patent. Huawei performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the '413 patent and with the knowledge that the induced acts would constitute infringement. For example, Huawei provides the Huawei '413 Products that have the capability of operating in a manner that infringe one or more of the claims of the '413 patent, including at least claim 21, and Huawei further provides documentation and training materials that cause customers and end users of the Huawei '413 Products to utilize the products in a manner that directly infringe one or more claims of the '413 patent.[30] By providing instruction and training to customers and end-users on how to use the Huawei '413 Products in a manner that directly infringes one or more claims of the '413 patent, including at least claim 21, Huawei specifically intended to induce infringement of the '413 patent. On information and belief, Huawei engaged in such inducement to promote the sales of the Huawei '413 Products, e.g., through Huawei user manuals, product support, marketing

[30] *See e.g.,* RTN 980L V100R010C00 PRODUCT DOCUMENTATION (September 15, 2017); OPTIX OSN 8800 PRODUCT DOCUMENTATION PRODUCT VERSION: V100R008C10 (March 20, 2017); OPTIX OSN 6800 INTELLIGENT OPTICAL TRANSPORT PLATFORM PRODUCT DOCUMENTATION, PRODUCT VERSION V100R011C00 (March 3, 2017); OPTIX PTN 990 PACKET TRANSPORT PLATFORM OF PTN SERIES V100R008C00 CONFIGURATION GUIDE (August 31, 2017); OPTIX OSN 7500 PRODUCT DOCUMENTATION, PRODUCT VERSION V100R008C02 (December 15, 2016).

materials, and training materials to actively induce the users of the accused products to infringe the '413 patent. Accordingly, Huawei has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '413 patent, knowing that such use constitutes infringement of the '413 patent.

116. The '413 patent is well-known within the industry as demonstrated by multiple citations to the '413 patent in published patents and patent applications assigned to technology companies and academic institutions. Huawei is utilizing the technology claimed in the '413 patent without paying a reasonable royalty. Huawei is infringing the '413 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

117. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '413 patent.

118. As a result of Huawei's infringement of the '413 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Huawei's infringement, but in no event less than a reasonable royalty for the use made of the invention by Huawei together with interest and costs as fixed by the Court.

## COUNT II
## INFRINGEMENT OF U.S. PATENT NO. 6,664,827

119. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

120. Huawei designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for timing circuitry.

121. Huawei designs, makes, sells, offers to sell, imports, and/or uses products incorporating timing devices, including: OptiX OSN 7500 and OptiX RTN 980 Radio Transmission System (collectively, the "Huawei '827 Product(s)").

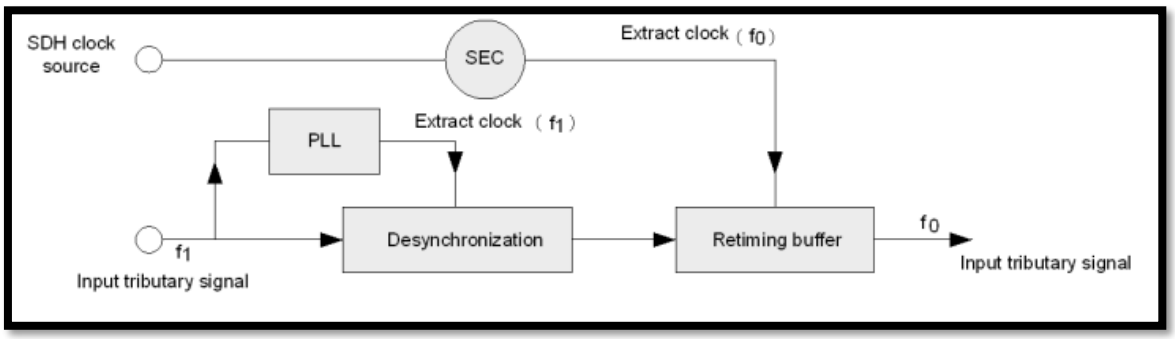
122. On information and belief, one or more Huawei subsidiaries and/or affiliates use the Huawei ’827 Products in regular business operations.

123. On information and belief, one or more of the Huawei ’827 Products include technology for a phase locked loop.

124. On information and belief, the Huawei ’827 Products are available to businesses and individuals throughout the United States.

125. On information and belief, the Huawei ’827 Products are provided to businesses and individuals located in the Eastern District of Texas.

126. On information and belief, the Huawei ’827 Products comprise a phase locked loop adapted to filter and store data indicative of a control signal.




OPTIX OSN 7500 PRODUCT DOCUMENTATION, PRODUCT VERSION V100R008C02 (December 15, 2016) (“With the retiming technology, the 2048 kbit/s tributary in an SDH system is able to transmit reference timing signals.”).

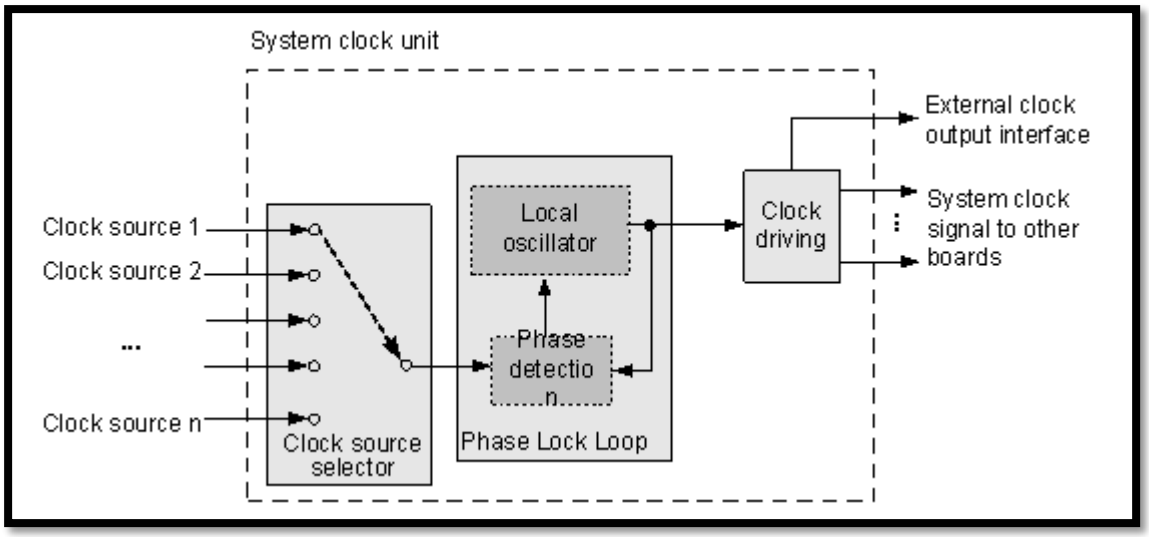
127. On information and belief, the Huawei ’827 Products comprise a control system that generates an output signal whose phase is related to the phase of an input signal.

128. On information and belief, the Huawei '827 Products comprise a frequency-selective circuit.

129. On information and belief, the Huawei '827 Products include a phase comparator.

130. On information and belief, the Huawei '827 Products contain a low-pass filter.

131. On information and belief, the Huawei '827 Products comprise an oscillator coupled in a feedback arrangement.




HUAWEI RTN 980L V100R010C00 PRODUCT DOCUMENTATION (September 15, 2017) (The above diagram show the principle block diagram of the system clock. "The discriminator compares the phases of the clock signals from the reference source and from the local oscillator and thus controls the output frequency of the oscillator according to the phase offset. The digital LLP adjusts the frequency of the local oscillator so that the output frequency of the oscillator is the same as the frequency of the reference clock source.").

132. On information and belief, the Huawei '827 Products include a phase comparator having a first input for the reference clock signal and a second input for the feedback signal.

133. On information and belief, the Huawei '827 Products contain functionality for sampling values of an error signal.

134. On information and belief, the Huawei ’827 Products contain functionality for sampling an error signal where the error signal is indicative of a phase relationship between a reference clock signal and a feedback signal.

135. On information and belief, Huawei has directly infringed and continues to directly infringe the ’827 patent by, among other things, making, using, offering for sale, and/or selling timing circuitry, including but not limited to the Huawei ’827 Products, which include infringing technology for monitoring the sampled error signal values for a step change in the phase difference between the reference clock signal and the feedback signal. Such products and/or services include, by way of example and without limitation, the Huawei ’827 Products.

136. On information and belief, the ‘827 Products comprise a system for monitoring the sampled error signal values for a step change in the phase difference between the reference clock signal and the feedback signal.

137. On information and belief, the ‘827 Products include functionality for recentering a phase comparator if a step change in the phase difference between the reference clock signal and the feedback signal is detected.

138. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Huawei ’827 Products, Huawei has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the ’827 patent, including at least claim 28, pursuant to 35 U.S.C. § 271(a).

139. On information and belief, Huawei also indirectly infringes the ’827 patent by actively inducing infringement under 35 USC § 271(b).

140. On information and belief, Huawei has had knowledge of the ’827 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Huawei knew of the ’827 patent and knew of its infringement, including by way of this lawsuit.

141. On information and belief, Huawei intended to induce patent infringement by third-party customers and users of the Huawei ’827 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Huawei specifically intended and was aware that the normal and customary use of the accused products would infringe the ’827 patent. Huawei performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ’827 patent and with the knowledge that the induced acts would constitute infringement. For example, Huawei provides the Huawei ’827 Products that have the capability of operating in a manner that infringe one or more of the claims of the ’827 patent, including at least claim 28, and Huawei further provides documentation and training materials that cause customers and end users of the Huawei ’827 Products to utilize the products in a manner that directly infringe one or more claims of the ’827 patent.[31] By providing instruction and training to customers and end-users on how to use the Huawei ’827 Products in a manner that directly infringes one or more claims of the ’827 patent, including at least claim 28, Huawei specifically intended to induce infringement of the ’827 patent. On information and belief, Huawei engaged in such inducement to promote the sales of the Huawei ’827 Products, e.g., through Huawei user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ’827 patent. Accordingly, Huawei has induced and continues to induce users of the accused

[31] *See e.g.*, RTN 980L V100R010C00 PRODUCT DOCUMENTATION (September 15, 2017); OPTIX OSN 7500 PRODUCT DOCUMENTATION, PRODUCT VERSION V100R008C02 (December 15, 2016).

products to use the accused products in their ordinary and customary way to infringe the '827 patent, knowing that such use constitutes infringement of the '827 patent.

142. The '827 patent is well-known within the industry as demonstrated by multiple citations to the '827 patent in published patents and patent applications assigned to technology companies and academic institutions. Huawei is utilizing the technology claimed in the '827 patent without paying a reasonable royalty. Huawei is infringing the '827 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

143. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '827 patent.

144. As a result of Huawei's infringement of the '827 patent, DIFF Scale Operation Research has suffered monetary damages, and seek recovery in an amount adequate to compensate for Huawei's infringement, but in no event less than a reasonable royalty for the use made of the invention by Huawei together with interest and costs as fixed by the Court.

## COUNT III
## INFRINGEMENT OF U.S. PATENT NO. 6,407,983

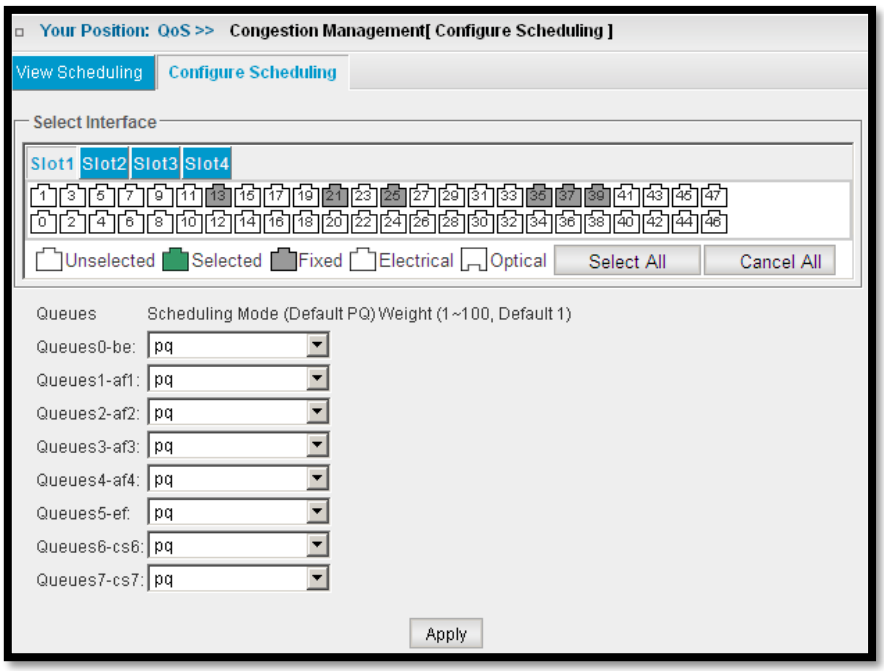
145. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

146. Huawei designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for traffic shaping that deliver data packets from one traffic source at a substantially uniform rate.

147. Huawei designs, makes, sells, offers to sell, imports, and/or uses switches, including: S7700 Series Switches; S9700 Series Switches; and S12700 Series Agile Switches (collectively, the "Huawei '983 Product(s)").

148. On information and belief, one or more Huawei subsidiaries and/or affiliates use the Huawei '983 Products in regular business operations.

149. On information and belief, one or more of the Huawei '983 Products include technology for traffic shaping.




S7700 V100R006C00 WEB SYSTEM GUIDE (October 3, 2012) (showing the congestion management traffic shaping functionality that enable queue scheduling technologies).

150. On information and belief, one or more of the Huawei '983 Products include technology for controlling data traffic on a network to match its transmission to the speed of the remote target interface.

151. On information and belief, the Huawei '983 Products are available to businesses and individuals throughout the United States.

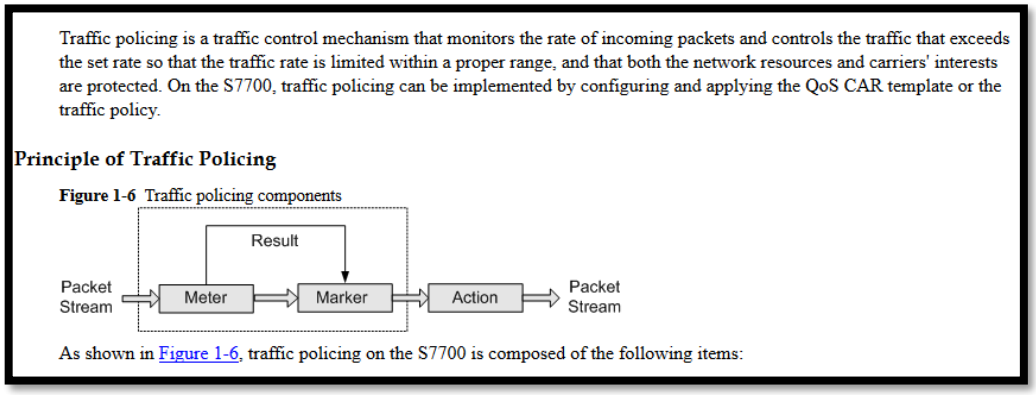
152. On information and belief, the Huawei '983 Products are provided to businesses and individuals located in the Eastern District of Texas.

153. On information and belief, Huawei has directly infringed and continues to directly infringe the '983 patent by, among other things, making, using, offering for sale, and/or selling technology for traffic shaping, including but not limited to the Huawei '983 Products, which include infringing technology for delivering data packets from at least one traffic source at a substantially uniform rate. Such products and/or services include, by way of example and without limitation, the Huawei '983 Products.

154. On information and belief, the Huawei '983 Products comprise a buffer that receives packets from at least one traffic source.

155. On information and belief, the Huawei '983 Products include a counter that indicates the beginning of each of a number of timeslots over a selectable time period.

156. On information and belief, the Huawei '983 Products comprise a request generator that creates request signals that request timeslots for transmitting data out of the buffer, wherein the requests are distributed over the time period based on at least one table so as to establish a desired data rate for the traffic source.



Traffic policing is a traffic control mechanism that monitors the rate of incoming packets and controls the traffic that exceeds the set rate so that the traffic rate is limited within a proper range, and that both the network resources and carriers' interests are protected. On the S7700, traffic policing can be implemented by configuring and applying the QoS CAR template or the traffic policy.

**Principle of Traffic Policing**

**Figure 1-6** Traffic policing components



As shown in Figure 1-6, traffic policing on the S7700 is composed of the following items:

S7700 V100R006C00 FEATURE DESCRIPTION - QOS (October 1, 2012) (showing that the Huawei '983 Products enable traffic shaping based on the rate at which packets are received).

157. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Huawei '983 Products, Huawei has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '983 patent, including at least claim 8, pursuant to 35 U.S.C. § 271(a).

158. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '983 patent.

159. As a result of Huawei's infringement of the '983 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Huawei's infringement, but in no event less than a reasonable royalty for the use made of the invention by Huawei together with interest and costs as fixed by the Court.

## COUNT IV
## INFRINGEMENT OF U.S. PATENT NO. 6,847,609

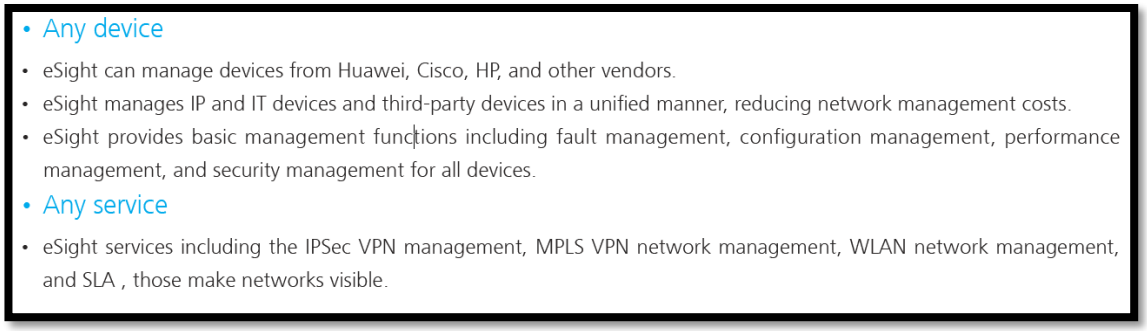
160. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

161. Huawei designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for network management.

162. Huawei designs, makes, sells, offers to sell, imports, and/or uses Huawei eSight Network Management Products, including: V300R009, V300R008, V300R006, V300R005, V300R003, V200R005, and V200R003 (collectively the, "Huawei '609 Product(s)").

163. On information and belief, one or more Huawei subsidiaries and/or affiliates use the Huawei '609 Products in regular business operations.

164. On information and belief, one or more of the Huawei '609 Products include technology for managing network elements.




*Huawei eSight Enterprise Management Solution*, HUAWEI PRODUCT BRIEF at 2 (February 8, 2012).

165. On information and belief, one or more of the Huawei '609 Products enable management of a network topology in which network nodes interconnect via one or more network switches.

166. On information and belief, the Huawei '609 Products are available to businesses and individuals throughout the United States.

167. On information and belief, the Huawei '609 Products are provided to businesses and individuals located in the Eastern District of Texas.

168. On information and belief, Huawei has directly infringed and continues to directly infringe the '609 patent by, among other things, making, using, offering for sale, and/or selling technology for management of network entities, including but not limited to the Huawei '609 Products, which include infringing technology for network management. Such products and/or services include, by way of example and without limitation, the Huawei '609 Products.

169. On information and belief, the Huawei '609 Products comprise a system that includes a service delivery unit that has a network interface port.

| User | Initial State | Initial Password | Login Mode | Description |
|---|---|---|---|---|
| Administrator | Enabled | Its initial password is specified by users.<br>**NOTE:**<br>The initial password is **Changeme123** in the pre-installation scenario. | Local login<br>**NOTE:**<br>Local login is supported by default. To support remote login, enable the remote desktop function. | **Administrator** is a default Windows OS user. It has the highest operation rights of the OS. The **Administrator** user can control all OS resources, create users, assign rights to the users, and use all the functions provided by the OS. In addition, the **Administrator** user can install or uninstall the eSight server application, and start or stop eSight services.<br>**NOTE:**<br>After the security of a Windows operating system is hardened, the **Administrator** user is reset to **SWMaster**. |
| ossuser | Enabled | **Changeme_123** | Local login<br>**NOTE:**<br>Local login is supported by default. To support remote login, enable the remote desktop function. | The ossuser account, automatically created by the eSight, performs routine operation and maintenance (O&M) for the eSight server. In the distributed deployment scenario, the **ossuser** user is an administrator account used to monitor and maintain distributed servers. It can be also used to back up and restore data on the slave node through the maintenance tool.<br>**NOTICE:**<br>If the password is changed on the slave node, change the password on the maintenance tool to maintain consistency. |
| sshd | Enabled | **Changeme_123** | Local login<br>**NOTE:**<br>Local login is supported by default. To support remote login, enable the remote desktop function. | The **sshd** account, automatically created by the eSight, is available when the **OpenSSH Server** service is provided by a distributed NMS. The user is for running commands related to the **OpenSSH Server** service. The user is created when upgrading **OpenSSH**. |

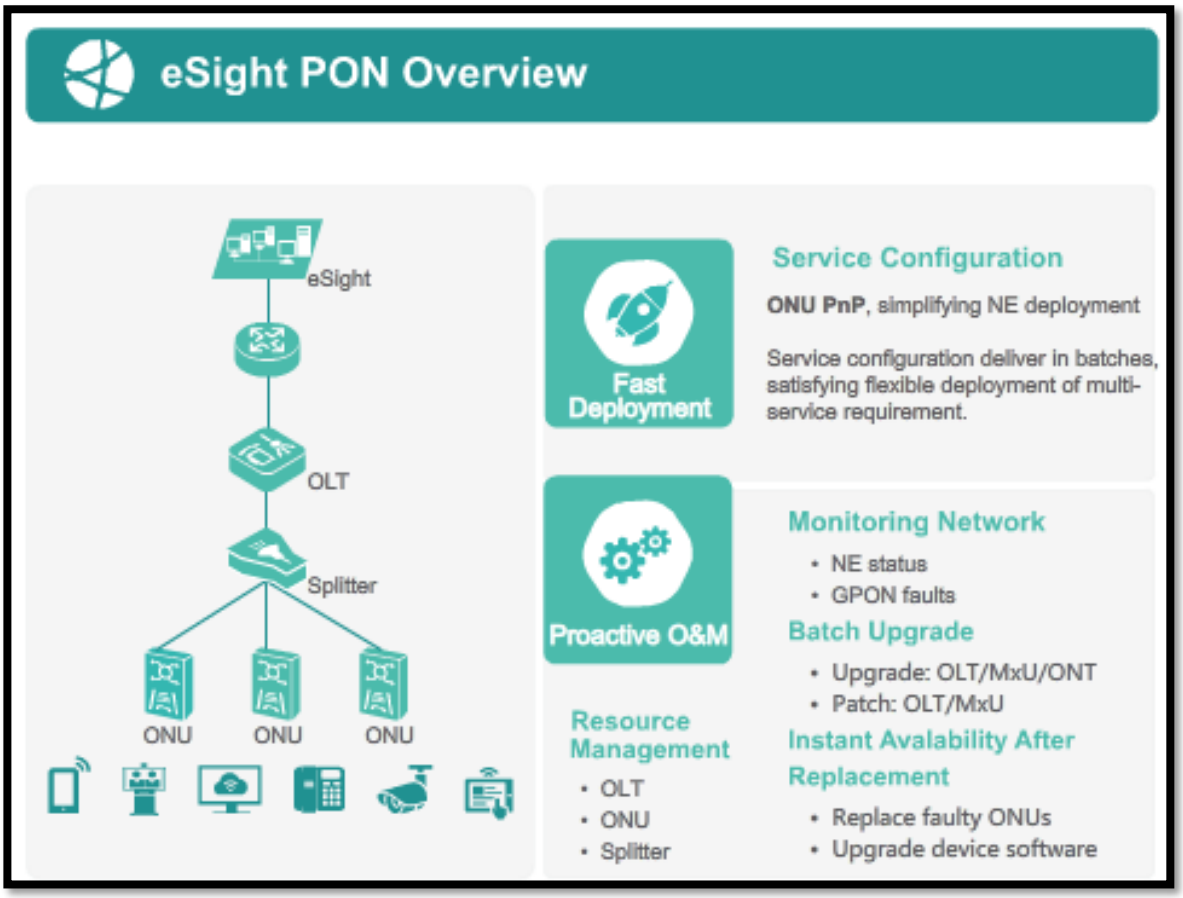
HUAWEI ESIGHT V300R006C00 ADMINISTRATOR GUIDE 06 (February 14, 2018) (showing various eSight system users can access and configure the system from various network management stations).

170. On information and belief, the Huawei '609 Products include functionality for a service delivery unit that is configured to store configuration data, control data, billing data, diagnostic data, and/or management data.

171. On information and belief, the Huawei '609 Products are a system that includes a service delivery unit that contains a data port coupleable to at least one local area network ("LAN").

172. On information and belief, the Huawei '609 Products comprise a system with a central processing unit that enables a network management terminal to view a configurable portion of the data in the memory and to allow a second network management terminal to view a second, configurable portion of the data in the memory to allow shared management of the service delivery unit.

173. On information and belief, the Huawei '609 Products include functionality for connecting to a switch fabric.




HUAWEI ESIGHT V300R008C00 PON MANAGEMENT FEATURE GLANCE PON FEATURE GLANCE (February 3, 2018).

174. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Huawei '609 Products, Huawei has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '609 patent, including at least claim 8, pursuant to 35 U.S.C. § 271(a).

175. On information and belief, Huawei also indirectly infringes the '609 patent by actively inducing infringement under 35 USC § 271(b).

176. On information and belief, Huawei has had knowledge of the '609 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Huawei knew of the '609 patent and knew of its infringement, including by way of this lawsuit.

177. On information and belief, Huawei intended to induce patent infringement by third-party customers and users of the Huawei '609 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Huawei specifically intended and was aware that the normal and customary use of the accused products would infringe the '609 patent. Huawei performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the '609 patent and with the knowledge that the induced acts would constitute infringement. For example, Huawei provides the Huawei '609 Products that have the capability of operating in a manner that infringe one or more of the claims of the '609 patent, including at least claim 8, and Huawei further provides documentation and training materials that cause customers and end users of the Huawei '609 Products to utilize the products in a manner that directly infringe one or more claims of the '609 patent.[32] By providing instruction and training to customers and end-users on how to use the Huawei '609 Products in a manner that directly infringes one or more claims of the '609 patent, including at least claim 8, Huawei specifically intended to induce infringement of the '609 patent. On information and belief, Huawei engaged in such inducement to promote the sales of the Huawei '609 Products, e.g., through Huawei user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe

[32] *See e.g., Huawei eSight Enterprise Management Solution*, HUAWEI PRODUCT BRIEF at 2 (February 8, 2012); HUAWEI ESIGHT V300R006C00 ADMINISTRATOR GUIDE 06 (February 14, 2018); HUAWEI ESIGHT V300R008C00 PON MANAGEMENT FEATURE GLANCE PON FEATURE GLANCE (February 3, 2018).

the ‘609 patent. Accordingly, Huawei has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘609 patent, knowing that such use constitutes infringement of the ‘609 patent.

178. The ‘609 patent is well-known within the industry as demonstrated by multiple citations to the ‘609 patent in published patents and patent applications assigned to technology companies and academic institutions. Huawei is utilizing the technology claimed in the ‘609 patent without paying a reasonable royalty. Huawei is infringing the ‘609 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

179. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘609 patent.

180. As a result of Huawei’s infringement of the ‘609 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Huawei’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Huawei together with interest and costs as fixed by the Court.

## COUNT V
## INFRINGEMENT OF U.S. PATENT NO. 6,940,810

181. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

182. Huawei designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for ring networks.

183. Huawei designs, makes, sells, offers to sell, imports, and/or uses Huawei networking switches, including the following products: Huawei Data Center Switch CloudEngine

12800, Huawei Data Center Switch CloudEngine 8800, Huawei Data Center Switch CloudEngine 7800, Huawei Campus Switch S2700, Huawei Campus Switch S3700, Huawei Campus Switch S5700, Huawei Campus Switch S6700, Huawei Campus Switch S7700, Huawei Campus Switch S9700, and Huawei Campus Switch S12700 (collectively, the "Huawei '810 Product(s)").

184. On information and belief, one or more Huawei subsidiaries and/or affiliates use the Huawei '810 Products in regular business operations.

185. On information and belief, one or more of the Huawei '810 Products include technology for protection switching of virtual connections at the data link level.

> The ports on both ends of the faulty link are blocked, and the RPL owner port in sub-ring 2 is unblocked to send and receive traffic. In this situation, traffic from PC1 still travels along the original path. SwitchC and SwitchD inform the other nodes in the major ring of the topology change so that traffic from PC2 is also not interrupted. Traffic between PC2 and the upper-layer network travels along the path PC2 -> SwitchG -> SwitchC -> SwitchB -> SwitchA -> SwitchE -> Router2.

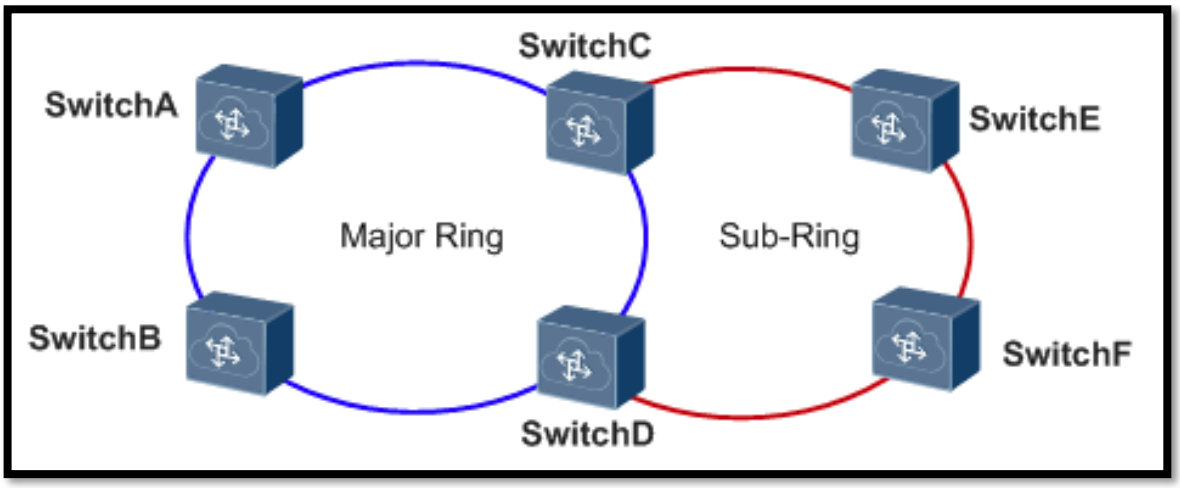
CLOUDENGINE 12800 PRODUCT DOCUMENTATION PRODUCT VERSION: V100R003C10 (December 1, 2014).

186. On information and belief, the Huawei '810 Products are available to businesses and individuals throughout the United States.

187. On information and belief, the Huawei '810 Products are provided to businesses and individuals located in the Eastern District of Texas.

188. On information and belief, Huawei has directly infringed and continues to directly infringe the '810 patent by, among other things, making, using, offering for sale, and/or selling networking technology, including but not limited to the Huawei '810 Products, which include infringing technology for protection switching of virtual connections at the data link layer. Such products and/or services include, by way of example and without limitation, the Huawei '810 Products.

189. The Huawei ‘810 Products comprise a system for a ring network.

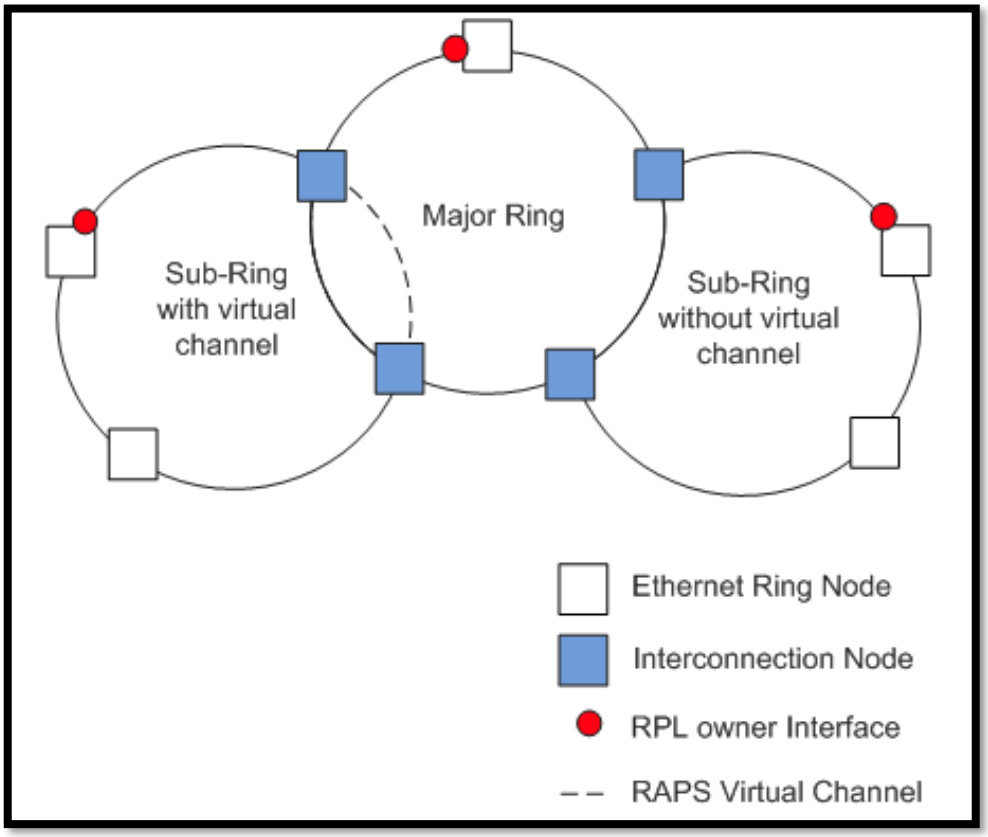



CLOUDENGINE 12800 PRODUCT DOCUMENTATION PRODUCT VERSION: V100R003C10 (December 1, 2014) (“An ERPS ring can be a major ring or a sub-ring. By default, an ERPS ring is a major ring. The major ring is a closed ring, whereas a sub-ring is a non-closed ring. The major ring and sub-ring are configured using commands. On the network shown in Figure 2, SwitchA through SwitchD constitute a major ring, and SwitchC through SwitchF constitute a sub-ring.”).

190. The Huawei ‘810 Products are a system wherein ring segments connected between adjacent network elements form routes for transporting cells using virtual connections.

191. The Huawei ‘810 Products comprise a system, wherein for each virtual connection, one route is a working route and the other route is a protection route.

192. The Huawei ‘810 Products comprise a system where the first and second routes are associated with the first and second switch fabrics.




S7700&S9700 PRODUCT DOCUMENTATION PRODUCT VERSION V200R008C00 (November 30, 2017) (showing that the Huawei product supports both virtual channels and non-virtual channels in multi-ring topologies with an interconnect).

193. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Huawei '810 Products, Huawei has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '810 patent, including at least claim 13, pursuant to 35 U.S.C. § 271(a).

194. On information and belief, Huawei also indirectly infringes the '810 patent by actively inducing infringement under 35 USC § 271(b).

195. On information and belief, Huawei has had knowledge of the '810 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Huawei knew of the '810 patent and knew of its infringement, including by way of this lawsuit.

196. On information and belief, Huawei intended to induce patent infringement by third-party customers and users of the Huawei '810 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Huawei specifically intended and was aware that the normal and customary use of the accused products would infringe the '810 patent. Huawei performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the '810 patent and with the knowledge that the induced acts would constitute infringement. For example, Huawei provides the Huawei '810 Products that have the capability of operating in a manner that infringe one or more of the claims of the '810 patent, including at least claim 13, and Huawei further provides documentation and training materials that cause customers and end users of the Huawei '810 Products to utilize the products in a manner that directly infringe one or more claims of the '810 patent.[33] By providing instruction and training to customers and end-users on how to use the Huawei '810 Products in a manner that directly infringes one or more claims of the '810 patent, including at least claim 13, Huawei specifically intended to induce infringement of the '810 patent. On information and belief, Huawei engaged in such inducement to promote the sales of the Huawei '810 Products, e.g., through Huawei user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '810 patent. Accordingly, Huawei has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '810 patent, knowing that such use constitutes infringement of the '810 patent.

[33] *See e.g.*, CLOUDENGINE 12800 PRODUCT DOCUMENTATION PRODUCT VERSION: V100R003C10 (December 1, 2014), S7700&S9700 PRODUCT DOCUMENTATION PRODUCT VERSION V200R008C00 (November 30, 2017), and S6700 PRODUCT DOCUMENTATION PRODUCT VERSION V200R001C00 (March 10, 2013).

197. The ‘810 patent is well-known within the industry as demonstrated by multiple citations to the ‘810 patent in published patents and patent applications assigned to technology companies and academic institutions. Huawei is utilizing the technology claimed in the ‘810 patent without paying a reasonable royalty. Huawei is infringing the ‘810 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

198. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘810 patent.

199. As a result of Huawei’s infringement of the ‘810 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Huawei’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Huawei together with interest and costs as fixed by the Court.

## COUNT VI
## INFRINGEMENT OF U.S. PATENT NO. 6,990,110

200. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

201. Huawei designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for automatic connection activation of permanent virtual circuits in communication networks.

202. Huawei designs, makes, sells, offers to sell, imports, and/or uses Huawei SmartAX MA5800 Series OLTs, including: MA5800-X17, MA5800-X15, MA5800-X7, and MA5800-X2 (collectively the, "Huawei '110 Product(s)").

203. On information and belief, one or more Huawei subsidiaries and/or affiliates use the Huawei '110 Products in regular business operations.

204. On information and belief, one or more of the Huawei '110 Products include technology for improvements in end-to-end provisioning of communication systems.

205. On information and belief, the Huawei '110 Products are available to businesses and individuals throughout the United States.

206. On information and belief, the Huawei '110 Products are provided to businesses and individuals located in the Eastern District of Texas.

207. On information and belief, Huawei has directly infringed and continues to directly infringe the '110 patent by, among other things, making, using, offering for sale, and/or selling technology for automatic connection activation, including but not limited to the Huawei '110 Products, which include infringing technology for automatic permanent virtual circuit connection activation. Such products and/or services include, by way of example and without limitation, the Huawei '110 Products.

208. On information and belief, the Huawei '110 Products comprise a system for detecting initiation of communication at a user network interface between a first and a second network element.

209. On information and belief, the Huawei '110 Products include functionality for identifying a virtual circuit identifier of the first network element.

210. On information and belief, the Huawei '110 Products include functionality for identifying a second virtual circuit identifier of the first network element.

211. On information and belief, the Huawei '110 Products are a system that enables creation of a translation connection between the first and second network elements.

212. On information and belief, the Huawei '110 Products enable identifying a virtual circuit identifier of the second network element that comprises receiving traffic from the second network element containing one virtual circuit identifier of the second network element and storing at least one virtual circuit identifier of the second network element.

213. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Huawei '110 Products, Huawei has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '110 patent, including at least claim 42, pursuant to 35 U.S.C. § 271(a).

214. On information and belief, Huawei also indirectly infringes the '110 patent by actively inducing infringement under 35 USC § 271(b).

215. On information and belief, Huawei has had knowledge of the '110 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Huawei knew of the '110 patent and knew of its infringement, including by way of this lawsuit.

216. Alternatively, Huawei has had knowledge of the '110 patent since at least February 16, 2010, when U.S. Patent No. 7,664,051, which is owned by Huawei and cites the '110 patent as relevant prior art, was issued. Further, U.S. Patent Application No. 2007/0297345 and WIPO Application No. WO2005117349A1 which are both assigned to Huawei cite the '110 patent as relevant prior art.

217. On information and belief, Huawei intended to induce patent infringement by third-party customers and users of the Huawei '110 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Huawei specifically intended and was aware that the normal and customary use of the accused products would infringe the '110 patent. Huawei performed the acts that

constitute induced infringement, and would induce actual infringement, with knowledge of the '110 patent and with the knowledge that the induced acts would constitute infringement. For example, Huawei provides the Huawei '110 Products that have the capability of operating in a manner that infringe one or more of the claims of the '110 patent, including at least claim 42, and Huawei further provides documentation and training materials that cause customers and end users of the Huawei '110 Products to utilize the products in a manner that directly infringe one or more claims of the '110 patent.[34] By providing instruction and training to customers and end-users on how to use the Huawei '110 Products in a manner that directly infringes one or more claims of the '110 patent, including at least claim 42, Huawei specifically intended to induce infringement of the '110 patent. On information and belief, Huawei engaged in such inducement to promote the sales of the Huawei '110 Products, e.g., through Huawei user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '110 patent. Accordingly, Huawei has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '110 patent, knowing that such use constitutes infringement of the '110 patent.

218. The '110 patent is well-known within the industry as demonstrated by multiple citations to the '110 patent in published patents and patent applications assigned to technology companies and academic institutions. Huawei is utilizing the technology claimed in the '110 patent without paying a reasonable royalty. Huawei is infringing the '110 patent in a manner best

[34] SMARTAX MA5800 PRODUCT DOCUMENTATION PRODUCT VERSION V100R016C10SPC200 (2016), HUAWEI SMARTAX MA5800 PRODUCT BROCHURE (2015), HUAWEI MA5800 V100R016C00 COMMISSIONING AND CONFIGURATION GUIDE 02 (August 20, 2015), HUAWEI MA5800 V100R016C00 FEATURE GUIDE 02 (September 2, 2016).

described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

219. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '110 patent.

220. As a result of Huawei's infringement of the '110 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Huawei's infringement, but in no event less than a reasonable royalty for the use made of the invention by Huawei together with interest and costs as fixed by the Court.

## COUNT VII
## INFRINGEMENT OF U.S. PATENT NO. 6,233,221

221. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

222. Huawei designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for a virtual path network.

223. Huawei designs, makes, sells, offers to sell, imports, and/or uses network switches and IoT gateways, including the following products: Huawei S5710HI Series Switches, Huawei S5700-LI Series Switches, Huawei E600 Education Network Switches, Huawei S6700 Series Switches, Huawei S5700 Series Switches, Huawei S3700 Series Enterprise Switches, Huawei AR2500 Series IoT Gateways, Huawei AR530 Series IoT Gateways, and AR1500 Series IoT Gateways (collectively, the "Huawei '221 Product(s)").

224. On information and belief, one or more Huawei subsidiaries and/or affiliates use the Huawei '221 Products in regular business operations.

225. On information and belief, one or more of the Huawei '221 Products include technology for network management.

226. On information and belief, the Huawei '221 Products are available to businesses and individuals throughout the United States.

227. On information and belief, the Huawei '221 Products are provided to businesses and individuals located in the Eastern District of Texas.

228. On information and belief, Huawei has directly infringed and continues to directly infringe the '221 patent by, among other things, making, using, offering for sale, and/or selling technology for network management, including but not limited to the Huawei '221 Products, which include infringing technology for a ring network with virtual path connections. Such products and/or services include, by way of example and without limitation, the Huawei '221 Products.

229. On information and belief, the Huawei '221 Products comprise a system that includes add/drop multiplexers coupled to form a ring including first and second routes for transmitting data around the network.

230. On information and belief, the Huawei '221 Products include at least one sub-network that includes a number of add/drop multiplexers coupled to form a ring including first and second routes for transmitting data around the network.

231. On information and belief, the Huawei '221 Products contain functionality for a first ring interconnection module that interconnects the first sub-network with one of the routes of the second sub-network.

232. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Huawei '221 Products, Huawei has injured DIFF Scale Operation

Research and is liable for directly infringing one or more claims of the ‘221 patent, including at least claim 18, pursuant to 35 U.S.C. § 271(a).

233. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘221 patent.

234. As a result of Huawei’s infringement of the ‘221 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Huawei’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Huawei together with interest and costs as fixed by the Court.

## COUNT VIII
## INFRINGEMENT OF U.S. PATENT NO. 6,859,430

235. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

236. Huawei designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for protection switching in a ring network.

237. Huawei designs, makes, sells, offers to sell, imports, and/or uses networking switches, including the following products: Huawei Data Center Switch CloudEngine 12800, Huawei Data Center Switch CloudEngine 8800, Huawei Data Center Switch CloudEngine 7800, Huawei Campus Switch S2700, Huawei Campus Switch S3700, Huawei Campus Switch S5700, Huawei Campus Switch S6700, Huawei Campus Switch S7700, Huawei Campus Switch S9700, and Huawei Campus Switch S12700 (collectively, the "Huawei '430 Product(s)").

238. On information and belief, one or more Huawei subsidiaries and/or affiliates use the Huawei ‘430 Products in regular business operations.

239. On information and belief, one or more of the Huawei '430 Products include technology for network management.

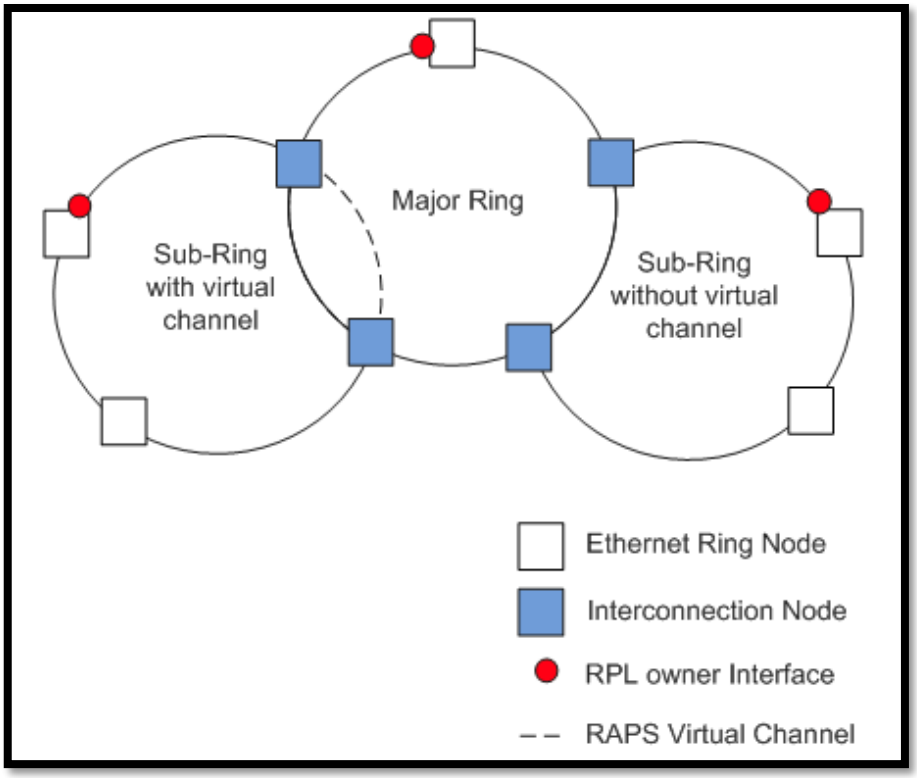
240. On information and belief, the Huawei '430 Products are available to businesses and individuals throughout the United States.

241. On information and belief, the Huawei '430 Products are provided to businesses and individuals located in the Eastern District of Texas.

242. On information and belief, Huawei has directly infringed and continues to directly infringe the '430 patent by, among other things, making, using, offering for sale, and/or selling technology for network management, including but not limited to the Huawei '430 Products, which include infringing technology for protection switching in a ring network. Such products and/or services include, by way of example and without limitation, the Huawei '430 Products.

243. On information and belief, the Huawei '430 Products comprise a number of network elements.

244. On information and belief, the Huawei '430 Products contain ring segments coupled between adjacent network elements to form first and second routes for transporting cells using virtual connections wherein, for each virtual connection, one route is a working route and the other route is a protection route.



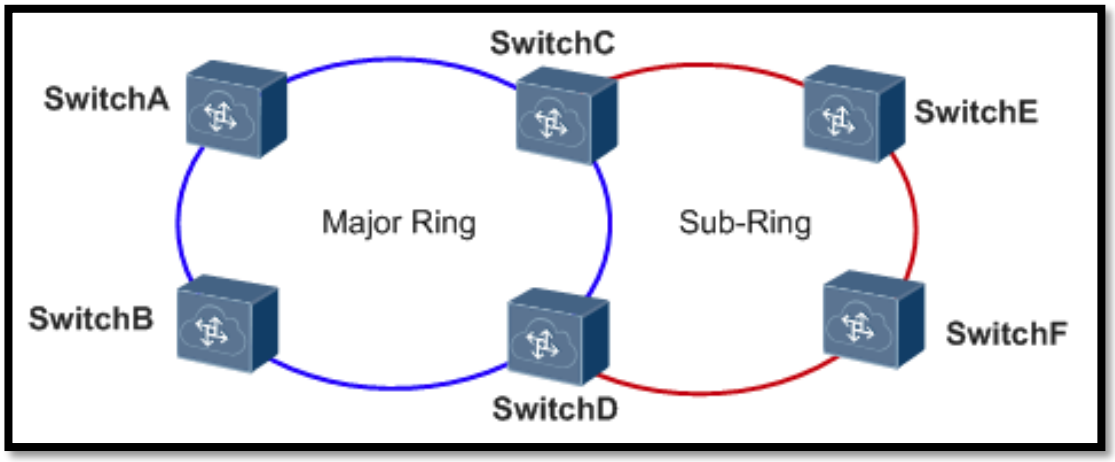

S7700&S9700 PRODUCT DOCUMENTATION PRODUCT VERSION V200R008C00 (November 30, 2017) (showing that the Huawei product supports both virtual channels and non-virtual channels in multi-ring topologies with an interconnect).

245. On information and belief, the Huawei '430 Products contain functionality wherein each network element separately tracks the status of a number of virtual connections on each route such that when an error is detected on the working route for a virtual connection, the network element switches to the protection route for the virtual connection.

> The ports on both ends of the faulty link are blocked, and the RPL owner port in sub-ring 2 is unblocked to send and receive traffic. In this situation, traffic from PC1 still travels along the original path. SwitchC and SwitchD inform the other nodes in the major ring of the topology change so that traffic from PC2 is also not interrupted. Traffic between PC2 and the upper-layer network travels along the path PC2 -> SwitchG -> SwitchC -> SwitchB -> SwitchA -> SwitchE -> Router2.

CLOUDENGINE 12800 PRODUCT DOCUMENTATION PRODUCT VERSION: V100R003C10 (December 1, 2014).

246. On information and belief, the Huawei '430 Products comprise a system wherein each network element includes two ring interface modules having a microprocessor, a physical layer device, and a switch fabric.




CLOUDENGINE 12800 PRODUCT DOCUMENTATION PRODUCT VERSION: V100R003C10 (December 1, 2014) ("An ERPS ring can be a major ring or a sub-ring. By default, an ERPS ring is a major ring. The major ring is a closed ring, whereas a sub-ring is a non-closed ring. The major ring and sub-ring are configured using commands. On the network shown in Figure 2, SwitchA through SwitchD constitute a major ring, and SwitchC through SwitchF constitute a sub-ring.").

247. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Huawei '430 Products, Huawei has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '430 patent, including at least claim 10, pursuant to 35 U.S.C. § 271(a).

248. On information and belief, Huawei has had knowledge of the '430 patent since at least November 21, 2012, when Chinese Patent No. 101465669B, which is owned by Huawei and cites the '430 patent as relevant prior art, was granted.

249. On information and belief, Huawei intended to induce patent infringement by third-party customers and users of the Huawei '430 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would

cause infringement. Huawei specifically intended and was aware that the normal and customary use of the accused products would infringe the '430 patent. Huawei performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the '430 patent and with the knowledge that the induced acts would constitute infringement. For example, Huawei provides the Huawei '430 Products that have the capability of operating in a manner that infringe one or more of the claims of the '430 patent, including at least claim 10, and Huawei further provides documentation and training materials that cause customers and end users of the Huawei '430 Products to utilize the products in a manner that directly infringe one or more claims of the '430 patent.[35] By providing instruction and training to customers and end-users on how to use the Huawei '430 Products in a manner that directly infringes one or more claims of the '430 patent, including at least claim 10, Huawei specifically intended to induce infringement of the '430 patent. On information and belief, Huawei engaged in such inducement to promote the sales of the Huawei '430 Products, e.g., through Huawei user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '430 patent. Accordingly, Huawei has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '430 patent, knowing that such use constitutes infringement of the '430 patent.

250. The '430 patent is well-known within the industry as demonstrated by multiple citations to the '430 patent in published patents and patent applications assigned to technology companies and academic institutions. Huawei is utilizing the technology claimed in the '430 patent without paying a reasonable royalty. Huawei is infringing the '430 patent in a manner best

[35] *See e.g.,* CLOUDENGINE 12800 PRODUCT DOCUMENTATION PRODUCT VERSION: V100R003C10 (December 1, 2014), S7700&S9700 PRODUCT DOCUMENTATION PRODUCT VERSION V200R008C00 (November 30, 2017), and S6700 PRODUCT DOCUMENTATION PRODUCT VERSION V200R001C00 (March 10, 2013).

described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

251. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '430 patent.

252. As a result of Huawei's infringement of the '430 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Huawei's infringement, but in no event less than a reasonable royalty for the use made of the invention by Huawei together with interest and costs as fixed by the Court.

## PRAYER FOR RELIEF

WHEREFORE, DIFF Scale Operation Research respectfully requests that this Court enter:

A. A judgment in favor of DIFF Scale Operation Research that Huawei has infringed, either literally and/or under the doctrine of equivalents, the '413, '827, '983, '609, '810, '110, '221, and '430 patents;

B. An award of damages resulting from Huawei's acts of infringement in accordance with 35 U.S.C. § 284;

C. A judgment and order finding that Huawei's infringement was willful, wanton, malicious, bad-faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate within the meaning of 35 U.S.C. § 284 and awarding to DIFF Scale Operation Research enhanced damages.

D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to DIFF Scale Operation Research their reasonable attorneys' fees against Huawei.

E. Any and all other relief to which DIFF Scale Operation Research may show

themselves to be entitled.

**JURY TRIAL DEMANDED**

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, DIFF Scale Operation Research, LLC requests a trial by jury of any issues so triable by right.

Dated: March 8, 2018

Respectfully submitted,

/s/ Daniel P. Hipskind

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