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ATTORNEYS FOR PLAINTIFFS WEICHIAO KU,
PI-LIEN KUO, AND ASSIGNEE GEORGE KU

SUPERIOR COURT OF CALIFORNIA, COUNTY OF SANTA CLARA

UNLIMITED JURISDICTION

WEICHIAO KU and PI-LIEN KUO, **Plaintiffs,** **v.** **HARALD HERCHEN, *et al*.** **Defendants.**	**Case No. 21CV376210** **DECLARATION OF DR. TAL LAVIAN IN OPPOSITION TO DEFENDANT'S MOTION FOR SUMMARY JUDGMENT** **Dept.: 20** **Judge: Hon. Socrates Manoukian** **Hearing Date: December 8, 2022** **Hearing Time: 9 a.m.**

I, Tal Lavian, declare:

1. I am over the age of eighteen years and I have personal knowledge of the matters stated herein. If called as a witness, I would competently attest thereto.

QUALIFICATIONS

2. Based on my qualifications, education, knowledge, expertise, and experience, I believe I am qualified to offer opinions relating to the networking technology described in the opposition to the motion for summary judgment. My qualifications for forming the opinions outlined in this declaration are summarized here and explained in more detail in my curriculum vitae. Appendix A. Appendix A also contains a list of my publications and patents.

3. I am the Principal Scientist for TelecommNet Engineering, Inc. I have been with the company since 2008. In my role at TelecommNet, I provide consulting and expert services in network communications, telecommunications, internet protocols, and smartphone mobile wireless devices. At TelecommNet, I also provide system architecture and technology analysis for computer networks, mobile wireless devices, and web technology projects.

4. Further, I am the CEO and CTO of Aybell (previously VisuMenu, Inc.). I founded VisuMenu, Inc. in 2010. At VisuMenu, Inc., I led the software design and development of a visual interactive voice response system for smartphones and mobile devices based on innovative wireless and network communications technologies.

5. In 2016, VisuMenu, Inc. was rebranded as Aybell. At Aybell, I have facilitated the design, architectural development, and implementation of a cloud data center for connecting any smartphone user to any company and service by digitizing interactive voice systems and exposing them through cloud-service application programming interfaces to other applications.

6. In 2008, I was a Network Communications Consultant for Ixia, a computer and wireless networking company. At Ixia, I researched and developed advanced network communications technologies.

7. From 1996 to 2007, I held several roles for Nortel Networks, a telecommunications and networking equipment company. I was a Principal Scientist, Principal Architect, Principal Engineer, and Senior Software Engineer. And I was the Principal Investigator for the U.S. Department of Defense Projects. In this role, I conceived, proposed, and completed three research projects—active networks, DWDM-RAM, and a networking computation project for the Air Force Research Lab.

8. At Nortel Networks, I was also an Academic and Industrial Researcher. In this role, I designed software for switches, routers, and network communications devices and developed systems and architectures for switches, routers, and network management.

9. From 1987 to 1995, I worked for three voice and data communication and software/hardware companies—Aptel Communications, Scitex Ltd., and Shalev. In these roles, I developed a mobile wireless device, designed and managed a personal communication network and personal communication system, invented and implemented a two-way paging product, developed system and network communications in C/C++, and developed real-time software and algorithms in C/C++ and Pascal.

10. Further, I have served as an industry fellow and lecturer at the UC Berkeley College of Engineering, Sutardja Center for Entrepreneurship. I have co-authored over 25 scientific publications, journal articles, and peer-reviewed papers.

11. I am a member of several professional organizations, including the Association of Computing Machinery ("ACM") and the Institute of Electrical and Electronics Engineers ("IEEE") (senior

member). I am also certified under the IEEE Wireless Communications Engineering Technologies ("WCET") 2012 Program, specifically designed by the IEEE Communications Society ("ComSoc") to address the worldwide wireless industry's growing and ever-evolving need for qualified communications professionals.

12. I received a B.S. degree in Mathematics and Computer Science from Tel Aviv University in 1987, an M.S. degree in Electrical Engineering from Tel Aviv University in 1996, and a Ph.D. in Computer Science specializing in network communications from UC Berkeley in 2006.

13. I have testified in Federal courts, the PTAB, and the ITC on behalf of leading companies such as Amazon, LinkedIn, AT&T, Sprint, Cisco Systems, Juniper Networks, Motorola, HP, LG, Samsung, and Apple. And I testified in over 80 depositions on network communications and telecommunications, including Internet protocols, streaming media, and mobile wireless technologies. Furthermore, I have served as an expert witness in over 140 patent-related cases where I wrote expert reports.

14. I am an inventor of over 120 patents, 60 of which I prosecuted pro se before the USPTO.

15. I have published many peer-reviewed articles and publications on network technology, a relevant sampling of which includes: "Implementation of a Quality of Service Feedback Control Loop on Programmable Routers" at the 12th IEEE International Conference on Networks 2004, "Practical Active Network Services within Content-Aware Gateways" at the proceeding of the DARPA Active Networks Conference and Exposition, 2002, and "Active Networking on a Programmable Network Platform" at the Fourth IEEE Conference on Open Architectures and Network Programming.

16. I have spent over a decade as an academic and industrial researcher. I have worked researching and developing many projects during that time, partly through heading research collaboration

with leading universities and professors at UC Berkeley, Northwestern University, University of Amsterdam, and the University of Technology, Sydney. Some of these projects include Data-Center Communications: network and server orchestration, Network resource orchestration for Web services workflows, and Packet capturing and forwarding service on IP and Ethernet.

17. I am a member of several professional organizations, including the IEEE Communications Society (COMMSOC), the ACM Special Interest Group on Data Communication (SIGCOM), the IEEE Consultants' Network (CNSV), and the Global Member of the Internet Society (ISOC).

18. I have many accomplishments in the field of network technology, such as leading the development of the first network resource scheduling service for grid computing, managing and engineering the first demonstrated dynamic transatlantic allocation of 10Gbs Lambdas as a grid service, and successful demonstration of the first wire-speed active network on commercial hardware.

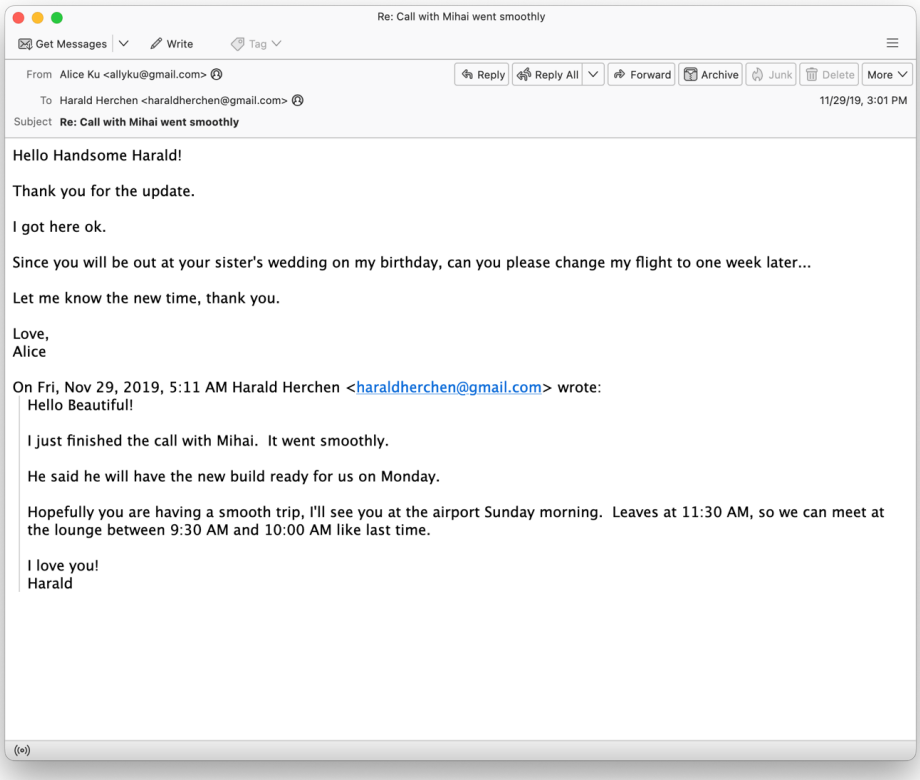
19. Based on my above-described over three decades of experience in network resource allocation and the acceptance of my publications and professional recognition by societies in my field, I believe that I am qualified to be an expert in the field of network technology.

20. Based on my knowledge, education, training, experience, and expertise described above, and as indicated in my curriculum vitae, I am qualified to provide the following opinions with respect to this case.

ANALYSIS

21. I was hired in this matter as an expert witness to consult on the November 29, 2019 email and related issues. I was provided the email by Plaintiffs' counsel, who indicated that the full email headers came from an email produced by Defendant, Dr. Harald Herchen. I examined the November 29, 2019 email and associated data, and I discuss my findings in the following section:

22. Here is a screenshot of the November 29, 2019 email, which is attached as Exhibit B:



23. Each email message contains raw headers that contain unique identifiers generated by the email service provider(s) responsible for transmitting an email, in this case Gmail. These identifiers are unique, generated automatically and are not altered by the user, but can be used to track an email and its transmission records for reporting purposes

24. Using any common, widely-used, email application (e.g., Microsoft Outlook) that comes free and pre-installed on even the most basic laptop, the average user can see an email's raw source, headers, and unique identifiers. Specialized software and in-depth knowledge or training to view raw headers and associated unique identifiers are not required. Raw headers are available for viewing to anyone with access to the original email or a complete copy thereof.

25. As part of the discovery process, the Plaintiffs' counsel obtained the November 29, 2019, email directly from the Defendant, who produced the email as an electronic file attachment. The Plaintiffs' counsel also separately subpoenaed Google for the same Gmail message and indicated to me that they received the email message headers and IP address.

26. Google also produced other unique identifiers of the email – (1) the IP address of the network through which the email message was submitted and (2) the SMTP ID[1] of the email, which is used to link an email to an IP address of the sending and receiving network.

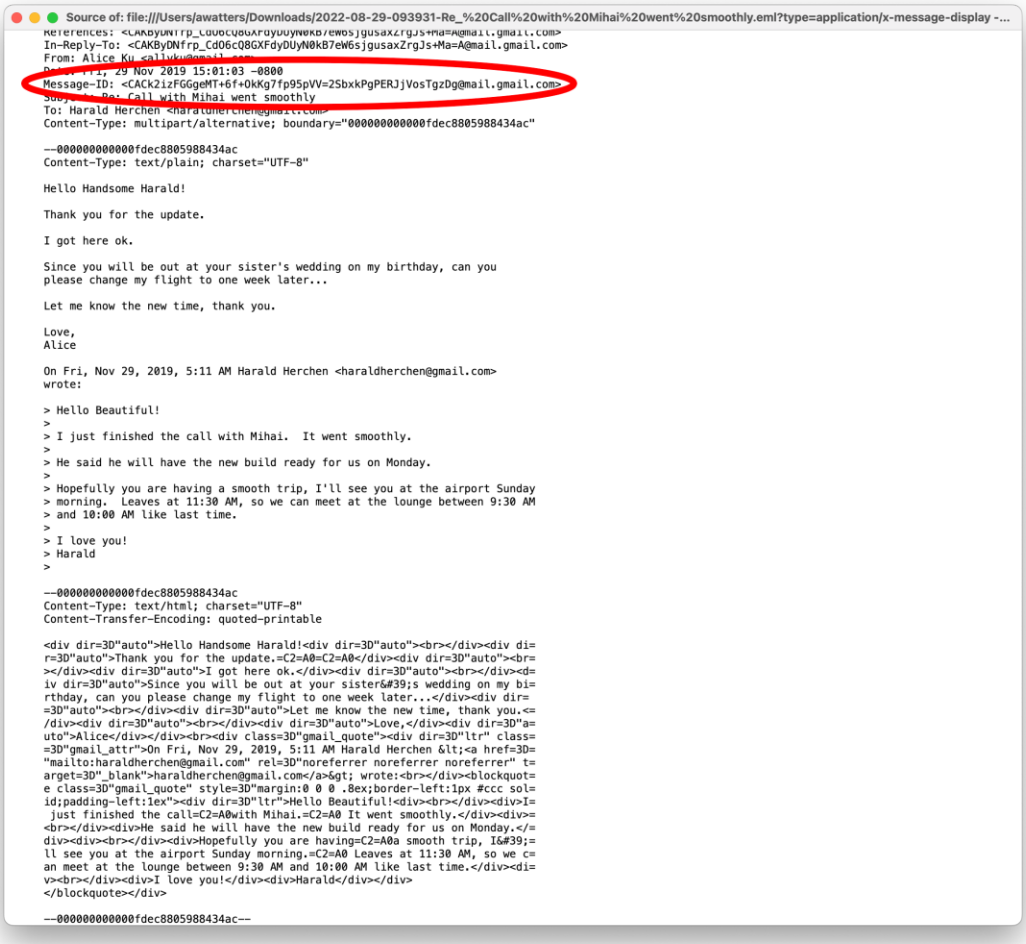
27. IP addresses in the IPv4 format are assigned to telecom entities in a process administered by the Internet Assigned Numbers Authority (IANA). IP addresses are traceable, unique, and are not replicated or otherwise altered by the recipient of an email. It is analogous to a street address which is unique. SMTP IDs are also unique and are not replicated or otherwise altered by the user, as they are stored on the email server through automated processes.

28. By matching an email's raw headers and unique identifiers – the sender and recipient's email addresses, transmission timestamps, the email's SMTP ID, and the IP address of the network used to send an email – an average consumer, without specialized training, education or software, can view these identifiers using commonly available, free, and pre-installed email

[1] The SMTP ID is the unique identifier on an email server of a particular message.

software to connect the time and date of when an email was sent and received, and from which physical location an email was sent.

29. Here is a screenshot of a portion of the November 29, 2019, email message in the form of raw headers, which show the SMTP ID (highlighted for readability) (Exhibit C):



Source of: file:///Users/awatters/Downloads/2022-08-29-093931-Re_%20Call%20with%20Mihai%20went%20smoothly.eml?type=application/x-message-display -...

References: <CAKByuNfrp_CdO6cQ8GXFdyOUyN0kB7eW6sjgusaxZrgJs+Ma=A@mail.gmail.com>
In-Reply-To: <CAKByuNfrp_CdO6cQ8GXFdyOUyN0kB7eW6sjgusaxZrgJs+Ma=A@mail.gmail.com>
From: Alice Ku <[redacted]>
Date: Fri, 29 Nov 2019 15:01:03 -0800
Message-ID: <CACk2izFGGgeMT+6f+OkKg7fp95pVV=2SbxkPgPERJjVosTgzDg@mail.gmail.com>
Subject: Re: Call with Mihai went smoothly
To: Harald Herchen <haraldherchen@gmail.com>
Content-Type: multipart/alternative; boundary="000000000000fdec8805988434ac"

--000000000000fdec8805988434ac
Content-Type: text/plain; charset="UTF-8"

Hello Handsome Harald!

Thank you for the update.

I got here ok.

Since you will be out at your sister's wedding on my birthday, can you
please change my flight to one week later...

Let me know the new time, thank you.

Love,
Alice

On Fri, Nov 29, 2019, 5:11 AM Harald Herchen <haraldherchen@gmail.com>
wrote:

> Hello Beautiful!
>
> I just finished the call with Mihai. It went smoothly.
>
> He said he will have the new build ready for us on Monday.
>
> Hopefully you are having a smooth trip, I'll see you at the airport Sunday
> morning. Leaves at 11:30 AM, so we can meet at the lounge between 9:30 AM
> and 10:00 AM like last time.
>
> I love you!
> Harald
>

--000000000000fdec8805988434ac
Content-Type: text/html; charset="UTF-8"
Content-Transfer-Encoding: quoted-printable

<div dir=3D"auto">Hello Handsome Harald!<div dir=3D"auto">
 <div di=
r=3D"auto">Thank you for the update.=C2=A0=C2=A0 <div dir=3D"auto"><br=
> <div dir=3D"auto">I got here ok. <div dir=3D"auto">
 <d=
iv dir=3D"auto">Since you will be out at your sister's wedding on my bi=
rthday, can you please change my flight to one week later... <div dir=
=3D"auto">
 <div dir=3D"auto">Let me know the new time, thank you.<=
/div><div dir=3D"auto">
 <div dir=3D"auto">Love, <div dir=3D"a=
uto">Alice
<div class=3D"gmail_quote"><div dir=3D"ltr" class=
=3D"gmail_attr">On Fri, Nov 29, 2019, 5:11 AM Harald Herchen <<a href=3D=
"mailto:haraldherchen@gmail.com" rel=3D"noreferrer noreferrer noreferrer" t=
arget=3D"_blank">haraldherchen@gmail.com> wrote:
 <blockquot=
e class=3D"gmail_quote" style=3D"margin:0 0 0 .8ex;border-left:1px #ccc sol=
id;padding-left:1ex"><div dir=3D"ltr">Hello Beautiful!
 I=
 just finished the call=C2=A0with Mihai.=C2=A0 It went smoothly. =

 He said he will have the new build ready for us on Monday.</=
div>
 Hopefully you are having=C2=A0a smooth trip, I'=
ll see you at the airport Sunday morning.=C2=A0 Leaves at 11:30 AM, so we c=
an meet at the lounge between 9:30 AM and 10:00 AM like last time. <di=
v>
 I love you! Harald
</blockquote>

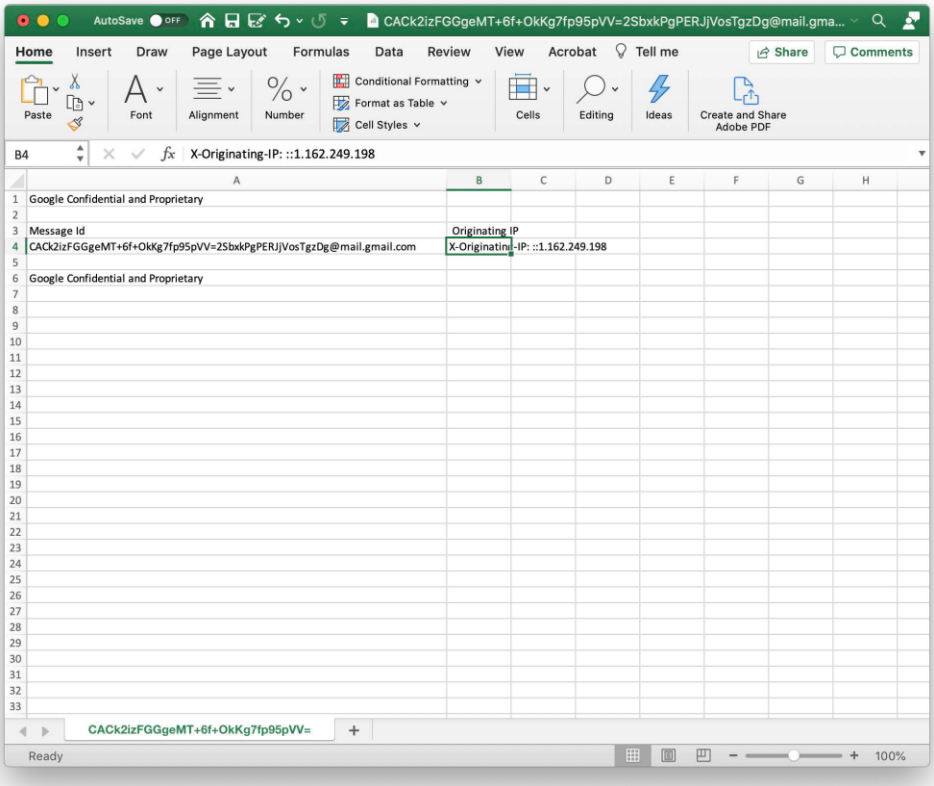
--000000000000fdec8805988434ac--

This screenshot shows many of the unique identifiers used to track and identify this email, as was sent to the Defendant's Gmail address from the Decedent's Gmail address.

30. The November 29, 2019 email was produced electronically by the Defendant, and separately by Google. The electronic file produced by the Defendant contains full email headers showing

various aspects of the email transmission between the Decedent and the Defendant, as received by the Defendant. The Google production shows the short headers but includes the SMTP ID, which matches the Defendant's production.

31. The electronic file produced by the Defendant and Google shows the same unique SMTP ID: <CACk2izFGGgeMT+6f+OkKg7fp95pVV=2SbxkPgPERJjVosTgzDg@mail.gmail.com> The ID was used to obtain the originating IP address of the email, which is the computer network from which the email was sent:

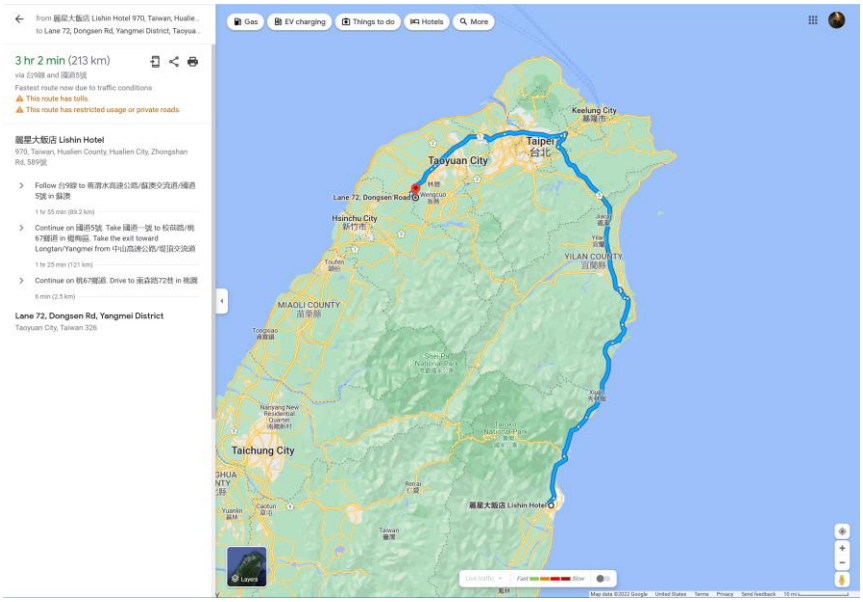


32. The originating IP address of the November 29, 2019, email was produced by Google in response to a subpoena, as discussed in Mr. Watters's declaration. The originating IP address of the November 29, 2019 email was **1.162.249.198**, which belongs to the HiNet network in

Taiwan and is reportedly the hotel Wi-Fi at the hotel in Hualien[2] where Defendant and the Decedent stayed on the 28th (and Defendant stayed by himself on the 29th). In any case, the IP address of the November 29, 2019 email is not the IP address of the Decedent's parents' house in Taoyuan City, which is from where the email purported to be sent. The parents' house IP address is reportedly: **49.216.234.158.**

33. The email file produced by both the Defendant and Gmail are authentic, as evidenced by the Gmail being the only email service prover, and by the ARC lines ("Authenticated Receive Chain") which are essentially a series of email server authentication signatures. Both email files have the same series of server signatures.

34. Here is a map of Taiwan showing the different locations:



It is approximately 160 miles by car between the hotel in Hualien and the parents' house.

35. The date of the message in question is November 29, 2019, at 3:01 p.m. Pacific time, which would be November 30, 2019, at 7:01 a.m. Taiwan time. The time difference is likely due to

[2] Declaration of CIB investigator.

the sender's computer time-zone difference between the US and Taiwan or time/date setting as the date and time of the message. The November 29, 2019, message was supposedly sent by Ms. Ku after she arrived on the other side of Taiwan.

36. The next notable fact is from the first line in the long headers, above the short headers:

In-Reply-To:
<CAKByDNfrp_CdO6cQ8GXFdyDUyN0kB7eW6sjgusaxZrgJs+Ma=A@mail.gmail.com>

This line indicates that the message sent from Ms. Ku's account was a reply to a message that was in her inbox, specifically the message with the referenced SMTP ID. That message was the message from Defendant that was quoted in the November 29, 2019, email. The reference shows that the November 29, 2019, email was a reply, which explains why the quoted message shows as having been read. In other words, the quoted message is not "unread" because it was replied to, and therefore someone clicked on Defendant's prior message in order to reply to it. It is possible to reply to a message and then re-mark it as unread, but this did not occur here because the Gmail production shows the message as read.

37. The final three lines in the email are also relevant:

Delivered-To: haraldherchen@gmail.com
Received: by 2002:ac8:3619:0:0:0:0:0 with SMTP id m25csp17477475qtb;
Fri, 29 Nov 2019 15:01:16 -0800 (PST)
X-Received: by 2002:a67:f708:: with SMTP id m8mr33974195vso.173.1575068476422;
Fri, 29 Nov 2019 15:01:16 -0800 (PST)

The first line shows the final delivery recipient—Defendant, who also uses Gmail.

The second line shows the email server that received this message. Although I am not familiar

with Google's internal email architecture—a trade secret—the IP address 2002:ac8:3619:0:0:0:0:0 is a private, reserved address which would be used internally at Google. The same goes for IP address 2002:a67:f708:: -- in other words, because both Defendant and Ms. Ku used Gmail, the email was sent entirely within Google's systems and did not exit Google. Therefore, no external IP addresses are shown in the headers.

SUMMARY

38. In summary, the digital evidence shows the following:

A. The November 29, 2019, email was sent from the hotel where Counsel advised me that the Defendant testified he was staying by himself on the night of the Decedent's disappearance. The IP address of the email is that of the hotel Wi-Fi, which is where the Decedent's email account was logged in.

B. The November 29, 2019, email was sent from the Decedent's account on Gmail, using the web interface of Gmail on a device from which the Decedent was still logged into Gmail.

C. At first glance, the November 29, 2019, email appears to have taken an unexpectedly long time (10-12 seconds) to transmit from Taiwan back to Taiwan. However, it is more likely that the device in question was not automatically synchronizing its timestamp and the time setting on the device was simply off by 10 to 12 seconds. Typically, a phone will automatically sync frequently by the cellular service provider (and not by the phone owner manually). If you have a U.S. phone, and you land in Taiwan, when you get the local cellular service, the phone is automatically synchronized to the local time. Unlike a cellphone that is time-synchronized with the local cellular service, on a laptop or desktop

the time configuration is done by the user. The user can manually change the time-zone. In addition, the user can manually set the time (in addition to the time zone) or turn on/off the synchronization with a network time server. So, the inference I have drawn is that the November 29, 2019, email was sent from a laptop or desktop computer that was not automatically syncing with a network time server and had not been manually set to Taiwan time. Counsel advised me that Defendant testified that he brought his work-issued laptop to Taiwan on that trip. Counsel advised me that there was also a laptop computer of the Decedent in Defendant's possession at some point, although Defendant indicated at one of the depositions that the Decedent did not bring the laptop to Taiwan. It would have been more difficult to send the November 29, 2019, email from a phone without raising suspicion for several reasons, starting with the fact that an email from a phone would likely have been from a Taiwanese mobile phone provider's computer network/IP range, rather than the hotel Wi-Fi, and the timestamp would have been accurate.

D. There was no subsequent Gmail logout from the device that sent the November 29, 2019 email.

The November 29, 2019 email cannot have been sent by the Decedent, because (1) the parents' IP address is not the originating IP address of the email as indicated above (the parents' IP address also maps to the other side of Taiwan), (2) Counsel advised me that according to her parents, the Decedent had not, in fact, arrived at her parents' house, (3) Counsel advised me that the parents' house is several hours away from the hotel by train or car on the other side of Taiwan, and there is no possibility that the hotel Wi-Fi IP address is the parents' IP address. Counsel advised me that this is in addition to the fact that the

parents reportedly had no idea the Decedent was in Taiwan and were not expecting her. The email in question came from the hotel Wi-Fi in Hualien. Accordingly, someone in the hotel or on the hotel Wi-Fi (as triple-confirmed by the login/logout history, the email IP address produced by Google, and otherwise) is the only person who could have sent the November 29, 2019 email.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date: November 22, 2022

DocuSigned by:
Tal Lavian
86EA69B7A94C472...
11/22/2022 | 10:02:24 AM PST

Dr. Tal Lavian

Exhibit A

Tal Lavian, Ph.D.

https://TelecommNet.com
tlavian@TelecommNet.com

Encino, CA 91316
(408)-209-9112

Telecommunications, Network Communications, Mobile Wireless, and Internet Technologies Expert

Dr. Lavian is a scientist, educator, and technologist with over 35 years of experience. He has co-authored over 25 scientific publications, journal articles, and peer-reviewed papers. Dr. Lavian is an expert in network communications and telecommunications, including Internet protocols, computer networks, streaming media, and mobile wireless technologies. He is an inventor of over 120 patents and over 60 prosecuted *pro-se.* Dr. Lavian has also served as Principal Investigator (PI) for three US Department of Defense (DARPA) projects.

EDUCATION

- **Ph.D.**, Computer Science specializing in network communications, U.C. Berkeley, 2006
- **M.Sc.**, Electrical Engineering ('97) Tel Aviv University. **B.Sc.**, Mathematics and Computer Science ('87)

EXPERTISE

Network communications, telecommunications, Internet protocols, and mobile wireless:

• **Network Communications:** Internet protocols; TCP/IP suite, TCP, UDP, IP, Ethernet, 802.3, network protocols, network software applications, data link, network, transport layers, SNMP, NMS, network management, packet switching, and network architecture.

• **VoIP/Streaming Media:** VoIP, SIP, RTP, video/audio conferencing, streaming media, IP telephony, transport systems, PSTN, circuit switching, WebRTC, SS7, SONET, and TDM.

• **Mobile wireless:** Wi-Fi, 802.11, Bluetooth, Wireless LAN (WLAN), MAC, PHY, ARQ, HARQ. Cellular, SMS, MMS, instant messaging (chat), mobile devices, and smartphones.

• **Internet/cloud:** Internet Technologies, Web applications, HTTP, e-mail, SMTP, POP, IMAP, firewalls, security, FTP, client-server, cloud computing, and distributed computing.

• **Routing/switching:** LAN, WAN, VPN, encapsulation, routing protocols, RIP, BGP, MPLS, OSPF, multicast, VPLS, Pseudowire, DNS, QoS, queuing, traffic control, network infrastructure, and architectures.

Dr. Lavian has extensive experience in the software development of computer networks, architectures, configurations, installations, and network testing. He has academic and hands-on experience in the above fields, including technology products from different companies, implementations, related standards, designs, systems, hardware, and software technologies.

ACCOMPLISHMENTS

- Principal Investigator (PI) for three US Department of Defense (DARPA) projects.
  - Directed networking computation project for the US Air Force Research Lab (AFRL).
  - PI of a wireless research project for an undisclosed US federal agency.
- Led and developed the first network resource scheduling service for grid computing.
- Managed and engineered the first demonstrated dynamic transatlantic allocation of 10Gbs Lambdas as a grid service.

- Development and successfully demonstrate the first wire-speed active network on commercial hardware.
- An inventor of over 120 patents, over 60 prosecuted *pro-se* before the USPTO.
- Created and chaired Nortel Networks' EDN Patent Committee.

EXPERT WITNESS

Dr. Lavian has served as an expert witness in cases involving over 140 patents, providing expert reports and testimony in over 70 depositions. He has also testified in Federal courts, before judges and juries, USPTO PTAB IPR, and the ITC. These cases involved leading companies such as Amazon, LinkedIn, Avaya, Netflix, T-Mobile, ZTE, Ericsson, Cisco Systems, Juniper Networks, Polycom, Motorola, LG, WhatsApp, Instagram, Microsoft, Google, Huawei, Facebook, and Apple.

PROFESSIONAL EXPERIENCE

The University of California, Berkeley, Berkeley, California 2000-2019
U.C. Berkeley SkyDeck, Industry Fellow, Lecturer, Visiting Scientist, Ph.D. Candidate, Nortel's Scientist Liaison
Some positions and projects were concurrent, others sequential

- U.C. Berkeley SkyDeck startups - advanced technology research, development, business, and market.
- Industry fellow and lecturer at the Sutardja Center for Entrepreneurship and Technology (SCET).
- Conducted research projects in data centers (RAD Labs), telecommunication infrastructure (SAHARA), and wireless systems (ICEBERG).
- Acted as a scientific liaison between Nortel Research Lab and U.C. Berkeley, providing tangible value in advanced technologies.
- Developed long-term technology for the enterprise market, integrating communication and computing technologies.
- Studied network services, telecommunication systems and software, communications infrastructure, and data centers.
- Earned a Ph.D. in Computer Science with a specialization in network communications.

TelecommNet Engineering, Inc. Sunnyvale, California 2006-Present
Principal Scientist

- Consulting in network communications, telecommunications, Internet protocols, and smartphone mobile wireless devices.
- Providing system architecture and technology analysis for projects on computer networks, mobile wireless devices, and Internet web technologies.
- Providing expert witness services in network communications patent infringement lawsuits.

CRadar.Ai, U.C. Berkeley, California 2018-2019
CTO / Principal Investigator

- CRadar.Ai improves the Radar wireless RF signal phase noise purity by 100x.
- Accurate Radars are paramount for self-driving car safety. Radars "see" where Cameras and LiDars are "blind" (fog, rain, snow, direct sunlight, and darkness).

- The superior wireless RF signal quality provides a clean signal for high Radar accuracy.
- Improving Radar accuracy and resolution enables genuine redundancy and sensory fusion and puts the Radar into the sensory spearhead.

Aybell (VisuMenu Inc.), U.C. Berkeley, California 2016-Present

CEO/CTO

- Aybell transforms smartphones into visual menu systems, making the phone a frictionless point for user interactions with customer service platform features. Empowers consumers to reach suitable agents in call centers, overcoming customer service barriers. Aybell is a branding and marketing of VisuMenu advanced technologies.
- Architecture, design, and implementation of a cloud data center for connecting smartphone users to any company and service by digitizing interactive voice systems and exposing APIs to other applications through cloud service.
- The system was deployed as a cloud networking and cloud computing service on Amazon Web Services (AWS) and Google Cloud Platform (GCP).
- Technologies include Data Science analytics, Machine Learning (ML), Artificial Intelligence (AI), and Statistical Learning (SL). Building an NLP Parser using Python, NLTK, SpaCy, and other NLP libraries and modules.

VisuMenu, Inc., Sunnyvale, California 2010-2016

Co-Founder and Chief Technology Officer (CTO)

- Led the software design and development of a visual IVR system for smartphones and other mobile devices, based on the innovative use of wireless and network communications technologies.
- Designed a voice search engine for IVR / PBX using Asterisk, SIP, and VoIP.
- The system was deployed as a cloud networking and cloud computing service on Amazon Web Services (AWS) and Google Cloud Platform (GCP).
- VisuMenu advanced technologies rebranded as Aybell.

Ixia, Santa Clara, California 2008 - 2008

Network Communications Consultant

Researched and developed advanced network communications testing technologies:

- IxNetwork/IxN2X —IP routing, switching devices, and broadband access equipment. Provided traffic generation and emulation for the full range of protocols: OSPF, RIP, EIGRP, BGP, IS-IS, MPLS, unicast, multicast, broadcast, layer 2/3 VPNs, IPSec, carrier Ethernet, broadband access, and data center bridging. Tested and validated IEEE, ITU, and IETF RFC standards compatibility.
- IxLoad — quickly and accurately modeled high-volume video, data, and voice subscribers and servers to test the real-world performance of multiservice delivery and security platforms.
- IxCatapult — emulated a broad range of wireless access and core protocols to test wireless components and systems that, combined with IxLoad, provide an end-to-end solution for testing wireless service quality.

- IxVeriWave — employed a client-centric model to test Wi-Fi and wireless LAN networks by generating repeatable large-scale, real-world test scenarios that are virtually impossible to create by any other means.
- Test automation — provided simple, comprehensive lab automation to help test engineering teams create, organize, catalog, and schedule execution of tests.

Nortel Networks, Santa Clara, California 1996 - 2007

Employed initially by Bay Networks, later acquired by Nortel Networks

Principal Scientist, Principal Architect, Principal Engineer, Senior Software Engineer

Held scientific and research roles at Nortel Labs, Bay Architecture Labs, and the CTO's office.

Principal Investigator for U.S. Department of Defense (DARPA) Projects

- Conceived, proposed and completed three research projects: active networks, DWDM-RAM, and a networking computation project for Air Force Research Lab (AFRL).
- Led a wireless research project for an undisclosed U.S. federal agency.

Academic and Industrial Researcher

- Analyzed new technologies to reduce risks associated with R&D investment.
- Headed research collaboration with leading universities and professors at U.C. Berkeley, Northwestern University, University of Amsterdam, and the University of Technology, Sydney.
- Evaluated competitive products relative to Nortel's products and technology.
- Proactively identified prospective business ideas, leading to new networking products.
- Predicted technological trends through researching the technological horizon and academic sphere.
- Designed software for switches, routers, and network communications devices.
- Developed systems and architectures for switches, routers, and network management.
- Researched and developed the following projects:
  - Data-Center Communications: network and server orchestration 2006-2007
  - DRAC: SOA-facilitated L1/L2/L3 network dynamic controller 2003-2007
  - Omega: classified project for undisclosed U.S. Federal Agency 2006-2006
  - Platform project for the U.S. Air Force Research Laboratory (AFRL) 2005-2005
  - Network resource orchestration for Web services workflows 2004-2005
  - A proxy study between Web/grids services and network services 2004-2004
  - Streaming content replication: real-time A/V media multicast at edge 2003-2004
  - DWDM-RAM: U.S. DARPA-funded program on agile optical transport 2003-2004
  - Packet capturing and forwarding service on IP and Ethernet traffic 2002-2003
  - CO2: content-aware agile networking 2001-2003
  - Active networks: US DARPA-funded research program 1999-2002
  - ORE: programmable network service platform 1998-2002
  - JVM platform: Java on network devices 1998-2001
  - Web-based device management: network device management 1996-1997

Technology Innovator and Patent Leader

- Created and chaired Nortel Networks' EDN Patent Committee.
- Facilitated a continuous stream of innovative ideas and their conversion into intellectual property rights.
- Developed intellectual property assets through invention and analysis of existing technology portfolios.

Aptel Communications, Netanya, Israel 1994-1995

Software Engineer, Team Leader

Start-up company focused on mobile wireless CDMA spread spectrum PCN/PCS.

- Developed a mobile wireless device using an unlicensed band - Direct Sequence Spread Spectrum (DSSS); FCC part 15 - unlicensed transmitters.
- Designed and managed a personal communication network (PCN) and personal communication system (PCS), which were the precursors of short text messages (SMS).
- Designed and developed network communications software products in C/C++.
- Invented and implemented a two-way paging product.

Scitex Ltd., Herzeliya, Israel 1990-1993

Software Engineer, Team Leader

Software and hardware company acquired by Hewlett Packard (HP)

- Developed system and network communications in C/C++.
- I provided IT services, System Administration, and network administration.
- I worked on Unix systems, including IBM AIX, HP, and SUN Unix.
- Invented Parallel SIMD Architecture.
- Participated in the Technology Innovation group.

Shalev, Ramat-HaSharon, Israel 1987-1990

Start-up company

Software Engineer

- Developed real-time software and algorithms in C/C++ and Pascal.

PROFESSIONAL ASSOCIATIONS

- IEEE senior member
- IEEE CNSV co-chair, Intellectual Property SIG (2013)
- President Next Step Toastmasters (an advanced TM club in the Silicon Valley) (2013-2014)
- Technical co-chair, IEEE Hot Interconnects 2005 at Stanford University
- Member, IEEE Communications Society (COMMSOC)
- Member, IEEE Computer Society
- Member, IEEE Systems, Man, and Cybernetics Society
- Member, IEEE-USA Intellectual Property Committee (2012)
- Member, ACM, ACM Special Interest Group on Data Communication (SIGCOM)
- Member, ACM Special Interest Group on Hypertext, Hypermedia, and Web (SIGWEB)
- Member, IEEE Consultants' Network (CNSV)
- Global Member, Internet Society (ISOC)
- President Java Users Group – Silicon Valley Mountain View, CA,1999-2000
- Toastmasters International

FORMER ADVISORY BOARDS POSITIONS

- Quixey –search engine for wireless mobile apps
- Mytopia – mobile wireless social games
- iLeverage – Israeli Innovations

PROFESSIONAL AWARDS

- Top Talent Award – Nortel
- Top Inventors Award – Nortel EDN
- Certified IEEE-WCET - Wireless Communications Engineering Technologies (2012)
- Toastmasters International - Competent Communicator (twice)
- Toastmasters International - Advanced Communicator Bronze
- Best Paper Presentation Award - ICE/IEEE Conference. "R&D Models for Advanced Development & Corporate Research"

PERSONAL

- USA FIT – San Jose Marathon running club (2017-2020)

Patents and Publications

Patents Issued
(Representative List)

US 9,690,877	Systems and methods for electronic communications	Link
US 9,660,655	Ultra-low phase noise frequency synthesizer	Link
US 9,184,989	Grid proxy architecture for network resources	Link
US 9,521,255	Systems and methods for visual presentation and selection of IVR menu	Link
US 9,083,728	Systems and methods to support sharing and exchanging in a network	Link
US 9,021,130	Photonic line sharing for high-speed routers	Link
US 8,762,963	Translation of programming code	Link
US 8,762,962	Methods and apparatus for automatic translation of a computer program language code	Link
US 8,745,573	Platform-independent application development framework	Link
US 8,731,148	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,688,796	Rating system for determining whether to accept or reject an objection raised by a user in a social network	Link
US 8,619,793	Dynamic assignment of traffic classes to a priority queue in a packet forwarding device	Link
US 8,572,303	A portable universal communication device	Link
US 8,553,859	Device and method for providing enhanced telephony	Link
US 8,548,131	Systems and methods for communicating with an interactive voice response system	Link
US 8,537,989	Device and method for providing enhanced telephony	Link
US 8,341,257	Grid proxy architecture for network resources	Link
US 8,161,139	Method and apparatus for intelligent management of a network element	Link
US 8,146,090	Time-value curves to provide dynamic QoS for time-sensitive file transfer	Link
US 8,078,708	Grid proxy architecture for network resources	Link
US 7,944,827	Content-aware dynamic network resource allocation	Link

US 7,860,999	Distributed computation in network devices	Link
US 7,734,748	Method and apparatus for intelligent management of a network element	Link
US 7,710,871	Dynamic assignment of traffic classes to a priority queue in a packet forwarding device	Link
US 7,580,349	Content-aware dynamic network resource allocation	Link
US 7,433,941	Method and apparatus for accessing network information on a network device	Link
US 7,359,993	Method and apparatus for external interfacing resources with a network element	Link
US 7,313,608	Method and apparatus for using documents written in a markup language to access and configure network elements	Link
US 7,260,621	The object-oriented network management interface	Link
US 7,237,012	Method and apparatus for classifying Java remote method invocation transport traffic	Link
US 7,127,526	Method and apparatus for dynamically loading and managing software services on a network device	Link
US 7,047,536	Method and apparatus for classifying remote procedure call transport traffic	Link
US 7,039,724	Programmable command-line interface API for managing the operation of a network device	Link
US 6,976,054	Method and system for accessing low-level resources in a network device	Link
US 6,970,943	Routing architecture includes a compute plane configured for high-speed processing of packets to provide application layer support.	Link
US 6,950,932	Security association mediator for Java-enabled devices	Link
US 6,850,989	Method and apparatus for automatically configuring a network switch	Link
US 6,845,397	Interface method and system for accessing inner layers of a network protocol	Link
US 6,842,781	Download and processing of a network management application on a network device	Link
US 6,772,205	Executing applications on a target network device using a proxy network device	Link
US 6,564,325	Method of and apparatus for providing multi-level security access to a system	Link
US 6,175,868	Method and apparatus for automatically configuring a network switch	Link
US 6,170,015	Network apparatus with Java co-processor	Link
US 8,687,777	Systems and methods for visual presentation and selection of IVR menu	Link

US 8,681,951	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,625,756	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,594,280	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,548,135	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,406,388	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,345,835	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,223,931	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,160,215	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,155,280	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,054,952	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,000,454	Systems and methods for visual presentation and selection of IVR menu	Link
EP 1,905,211	A technique for authenticating network users	Link
EP 1,142,213	Dynamic assignment of traffic classes to a priority queue in a packet forwarding device	Link
US 9,001,819	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,949,846	Time-value curves to provide dynamic QoS for time-sensitive file transfers	Link
US 8,929,517	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,903,073	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,898,274	Grid proxy architecture for network resources	Link
US 8,880,120	Device and method for providing enhanced telephony	Link
US 8,879,703	System method and device for providing tailored services when a call is on-hold	Link
US 8,879,698	Device and method for providing enhanced telephony	Link
US 8,867,708	Systems and methods for visual presentation and selection of IVR menu	Link
US 8,787,536	Systems and methods for communicating with an interactive voice response system	Link
US 8,782,230	Method and apparatus for using a command design pattern to access and configure network elements	Link
CA 2,358,525	Dynamic assignment of traffic classes to a priority queue in a packet forwarding device	Link

CA 2,989,752	Ultra-low Phase Noise Frequency Synthesizer	Link
US 10,598,764	Radar target detection and imaging system for autonomous vehicles with ultra-low phase noise frequency synthesizer	Link
US 10,404,261	Radar target detection system for autonomous vehicles with an ultra-low phase-noise frequency synthesizer	Link
US 10,348,313	Radar target detection system for autonomous vehicles with an ultra-low phase-noise frequency synthesizer	Link
US 10,205,457	RADAR target detection system for autonomous vehicles with an ultra-low phase-noise frequency synthesizer	Link
US 10,764,264	Technique for authenticating network users	Link
EP 3,311,493	An ultra-low phase-noise frequency synthesizer	Link
US 9,831,881	Radar target detection system for autonomous vehicles with ultra-low phase noise frequency synthesizer	Link
US 9,762,251	Ultra-low phase noise frequency synthesizer	Link
US 9,705,511	Ultra-low phase noise frequency synthesizer	Link

Patent Applications Published and Pending
(Representative List)

US 20150058490	Grid Proxy Architecture for Network Resources	Link
US 20150010136	Systems and Methods for Visual Presentation and Selection of IVR Menu	Link
US 20140379784	Method and Apparatus for Using a Command Design Pattern to Access and Configure Network Elements	Link
US 20140105025	Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device	Link
US 20140105012	Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device	Link
US 20140012991	Grid Proxy Architecture for Network Resources	Link
US 20130080898	Systems and Methods for Electronic Communications	Link
US 20130022191	Systems and Methods for Visual Presentation and Selection of IVR Menu	Link
US 20130022183	Systems and Methods for Visual Presentation and Selection of IVR Menu	Link
US 20130022181	Systems and Methods for Visual Presentation and Selection of IVR Menu	Link
US 20120180059	Time-Value Curves to Provide Dynamic QoS for Time Sensitive File Transfers	Link
US 20120063574	Systems and Methods for Visual Presentation and Selection of IVR Menu	Link
US 20110225330	Portable Universal Communication Device	Link
US 20100220616	Optimizing Network Connections	Link
US 20100217854	Method and Apparatus for Intelligent Management of a Network Element	Link
US 20100146492	Translation of Programming Code	Link
US 20100146112	Efficient Communication Techniques	Link
US 20100146111	Efficient Communication in a Network	Link
US 20090313613	Methods and Apparatus for Automatic Translation of a Computer Program Language Code	Link
US 20090313004	Platform-Independent Application Development Framework	Link
US 20090279562	Content-aware dynamic network resource allocation	Link
US 20080040630	Time-Value Curves to Provide Dynamic QoS for Time Sensitive File	Link

	Transfers	
US 20070169171	A technique for authenticating network users	Link
US 20060123481	Method and apparatus for network immunization	Link
US 20060075042	Extensible Resource Messaging Between User Applications and Network Elements in a Communication Network	Link
US 20050083960	Method and Apparatus for Transporting Parcels of Data Using Network Elements with Network Element Storage	Link
US 20050076339	Method and Apparatus for Automated Negotiation for Resources on a Switched Underlay Network	Link
US 20050076336	Method and Apparatus for Scheduling Resources on a Switched Underlay Network	Link
US 20050076173	Method And Apparatus for Preconditioning Data to Be Transferred on a Switched Underlay Network	Link
US 20050076099	Method and Apparatus for Live Streaming Media Replication in a Communication Network	Link
US 20050074529	Method and apparatus for transporting visualization information on a switched underlay network	Link
US 20040076161	Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device	Link
US 20020021701	Dynamic Assignment of Traffic Classes to a Priority Queue in a Packet Forwarding Device	Link
WO 2006/063052	Method and apparatus for network immunization	Link
WO 2007/008976	A technique for authenticating network users	Link
WO2000/0054460	Method and apparatus for accessing network information on a network device	Link
WO/2016/203460	Ultra-low phase noise frequency synthesizer	Link
WO/2005/033899	Method and apparatus for scheduling resources on a switched underlay network	Link
WO/2000/041368	Dynamic assignment of traffic classes to a priority queue in a packet forwarding device	Link
US 20140156556	A Time-variant rating system and method thereof	Link
US 20140156758	A Reliable rating system and method thereof	Link

US 20170085708	Systems and methods for visual presentation and selection of IVR menu	Link
US 20160373117	Ultra-low phase noise frequency synthesizer	Link
US 20170322687	Systems and methods for electronic communications	Link
US 20170302282	Radar target detection system for autonomous vehicles with ultra-low phase noise frequency synthesizer	Link
US 20180019755	Radar target detection system for autonomous vehicles with ultra-low phase noise frequency synthesizer	Link
US 20170289332	Systems and methods for visual presentation and selection of IVR menu	Link
US 20170269797	Systems and methods for electronic communication	Link
US 20170099058	Ultra-low phase noise frequency synthesizer	Link
US 20170099057	Ultra-low phase noise frequency synthesizer	Link
US 20190128998	Radar target detection and imaging system for autonomous vehicles with ultra-low phase noise frequency synthesizer	Link
US 20190082043	Systems and methods for visual presentation and selection of IVR menu	Link
US 20180146090	Systems and methods for visual presentation and selection of IVR menu	Link
US 20180130102	Reliable rating system and method thereof	Link

Publications
(Representative List)

- "R&D Models for Advanced Development & Corporate Research" Understanding Six Models of Advanced R&D - Ikhlaq Sidhu, Tal Lavian, Victoria Howell - University of California, Berkeley. ASEE Annual Conference and Exposition- 2015. Received "Best Paper Presentation Award" ICE/IEEE Conference June 2015.
- "Communications Architecture in Support of Grid Computing," Tal Lavian, Scholar's Press 2013ISBN 978-3-639-51098-0.
- "Applications Drive Secure Light-path Creation across Heterogeneous Domains, Feature Topic Optical Control Planes for Grid Networks: Opportunities, Challenges, and the Vision." Gommans L.; Van Oudenaarde B.; Dijkstra F.; De Laat C.; Lavian T.; Monga I.; Taal A.; Travostino F.; Wan A.; IEEE Communications Magazine, vol. 44, no. 3, March 2006, pp. 100-106.
- *Lambda Data Grid: Communications Architecture in Support of Grid Computing*. Tal I. Lavian, Randy H. Katz; Doctoral Thesis, University of California at Berkeley. January 2006.
- "Information Switching Networks." Hoang D.B.; T. Lavian; The 4th Workshop on the Internet, *Telecommunications and Signal Processing, WITSP2005*, December 19-21, 2005, Sunshine Coast, Australia.
- "Impact of Grid Computing on Network Operators and HW Vendors." Allcock B.; Arnaud B.; Lavian T.; Papadopoulos P.B.; Hasan M.Z.; Kaplow W.; *IEEE Hot Interconnects at Stanford University 2005*, pp.89-90.
- *DWDM-RAM: A Data Intensive Grid Service Architecture Enabled by Dynamic Optical Networks*. Lavian T.; Mambretti J.; Cutrell D.; Cohen H.J; Merrill S.; Durairaj R.; Daspit P.; Monga I.; Naiksatam S.; Figueira S.; Gutierrez D.; Hoang D.B., Travostino F.; *CCGRID 2004*, pp. 762-764.
- *DWDM-RAM: An Architecture for Data-Intensive Service Enabled by Next Generation Dynamic Optical Networks*. Hoang D.B.; Cohen H.; Cutrell D.; Figueira S.; Lavian T.; Mambretti J.; Monga I.; Naiksatam S.; Travostino F.; Proceedings IEEE Globecom 2004, Workshop on High-Performance Global Grid Networks, Houston, 29 Nov. to 3 Dec. 2004, pp.400-409.
- *Implementation of a Quality of Service Feedback Control Loop on Programmable Routers*. Nguyen C.; Hoang D.B.; Zhao, I.L.; Lavian, T.; Proceedings, 12th IEEE International Conference on Networks 2004. (ICON 2004) Singapore, Volume 2, 16-19 Nov. 2004, pp.578-582.
- *A Platform for Large-Scale Grid Data Service on Dynamic High-Performance Networks*. Lavian T.; Hoang D.B.; Mambretti J.; Figueira S.; Naiksatam S.; Kaushil N.; Monga I.; Durairaj R.; Cutrell D.; Merrill S.; Cohen H.; Daspit P.; Travostino F; GridNets 2004, San Jose, CA., October 2004.
- *DWDM-RAM: Enabling Grid Services with Dynamic Optical Networks*. Figueira S.; Naiksatam S.; Cohen H.; Cutrell D.; Daspit, P.; Gutierrez D.; Hoang D. B.; Lavian T.; Mambretti J.; Merrill S.; Travostino F; Proceedings, 4th IEEE/ACM International Symposium on Cluster Computing and the Grid, Chicago, USA, April 2004, pp. 707-714.

- *DWDM-RAM: Enabling Grid Services with Dynamic Optical Networks*. Figueira S.; Naiksatam S.; Cohen H.; Cutrell D.; Gutierrez D.; Hoang D.B.; Lavian T.; Mambretti J.; Merrill S.; Travostino F.; 4th IEEE/ACM International Symposium on Cluster Computing and the Grid, Chicago, USA, April 2004.
- *An Extensible, Programmable, Commercial-Grade Platform for Internet Service Architecture*. Lavian T.; Hoang D.B.; Travostino F.; Wang P.Y.; Subramanian S.; Monga I.; IEEE Transactions on Systems, Man, and Cybernetics on Technologies Promoting Computational Intelligence, Openness and Programmability in Networks and Internet Services Volume 34, Issue 1, Feb. 2004, pp.58-68.
- *DWDM-RAM: An Architecture for Data-Intensive Service Enabled by Next Generation Dynamic Optical Networks*. Lavian T.; Cutrell D.; Mambretti J.; Weinberger J.; Gutierrez D.; Naiksatam S.; Figueira S.; Hoang D. B.; Supercomputing Conference, SC2003 Igniting Innovation, Phoenix, November 2003.
- *Edge Device Multi-Unicasting for Video Streaming*. Lavian T.; Wang P.; Durairaj R.; Hoang D.; Travostino F.; Telecommunications, 2003. ICT 2003. 10th International Conference on Telecommunications, Tahiti, Volume 2, 23 Feb.-1 March 2003 pp. 1441-1447.
- The SAHARA Model for Service Composition Across Multiple Providers. Raman B.; Agarwal S.; Chen Y.; Caesar M.; Cui W.; Lai K.; Lavian T.; Machiraju S.; Mao Z. M.; Porter G.; Roscoe T.; Subramanian L.; Suzuki T.; Zhuang S.; Joseph A. D.; Katz Y.H.; Stoica I.; Proceedings of the First International Conference on Pervasive Computing. ACM Pervasive 2002, pp. 1-14.
- *Enabling Active Flow Manipulation in Silicon-Based Network Forwarding Engines*. Lavian T.; Wang P.; Travostino F.; Subramanian S.; Duraraj R.; Hoang D.B.; Sethaput V.; Culler D.; Proceeding of the Active Networks Conference and Exposition, 2002. (DANCE) 29-30 May 2002, pp. 65-76.
- *Practical Active Network Services within Content-Aware Gateways*. Subramanian S.; Wang P.; Durairaj R.; Rasimas J.; Travostino F.; Lavian T.; Hoang D.B.; Proceeding of the DARPA Active Networks Conference and Exposition, 2002. (DANCE) 29-30 May 2002, pp. 344-354.
- *Active Networking on a Programmable Network Platform*. Wang P.Y.; Lavian T.; Duncan R.; Jaeger R.; Fourth IEEE Conference on Open Architectures and Network Programming (OPEN ARCH), Anchorage, April 2002.
- *Intelligent Network Services through Active Flow Manipulation*. Lavian T.; Wang P.; Travostino F.; Subramanian S.; Hoang D.B.; Sethaput V.; IEEE Intelligent Networks 2001 Workshop (IN2001), Boston, May 2001.
- *Intelligent Network Services through Active Flow Manipulation*. Lavian T.; Wang P.; Travostino F.; Subramanian S.; Hoang D.B.; Sethaput V.; Intelligent Network Workshop, 2001 IEEE 6-9 May 2001, pp.73 -82.
- *Enabling Active Flow Manipulation in Silicon-based Network Forwarding Engine*. Lavian, T.; Wang, P.; Travostino, F.; Subramanian S.; Hoang D.B.; Sethaput V.; Culler D.; Journal of Communications and Networks, March 2001, pp.78-87.
- *Active Networking on a Programmable Networking Platform*. Lavian T.; Wang P.Y.; IEEE Open Architectures and Network Programming, 2001, pp. 95-103.

- *Enabling Active Networks Services on a Gigabit Routing Switch*. Wang P.; Jaeger R.; Duncan R.; Lavian T.; Travostino F.; 2nd Workshop on Active Middleware Services, 2000.
- *Dynamic Classification in Silicon-Based Forwarding Engine Environments*. Jaeger R.; Duncan R.; Travostino F.; Lavian T.; Hollingsworth J.; Selected Papers. 10th IEEE Workshop on Metropolitan Area and Local Networks, 1999. 21-24 Nov. 1999, pp.103-109.
- *Open Programmable Architecture for Java-Enabled Network Devices*. Lavian, T.; Jaeger, R. F.; Hollingsworth, J. K.; IEEE Hot Interconnects Stanford University, August 1999, pp. 265-277.
- *Open Java SNMP MIB API*. Rob Duncan, Tal Lavian, Roy Lee, Jason Zhou, Bay Architecture Lab Technical Report TR98-038, December 1998.
- *Java-Based Open Service Interface Architecture*. Lavian T.; Lau S.; BAL TR98-010 Bay Architecture Lab Technical Report, March 1998.
- *Parallel SIMD Architecture for Color Image Processing*. Lavian T. Tel – Aviv University, Tel – Aviv, Israel, November 1995.
- *Grid Network Services, Draft-ggf-ghpn-netservices-1.0*. George Clapp, Tiziana Ferrari, Doan B. Hoang, Gigi Karmous-Edwards, Tal Lavian, Mark J. Leese, Paul Mealor, InderMonga, Volker Sander, Franco Travostino, Global Grid Forum(GGF).
- *Project DRAC: Creating an applications-aware network*. Travostino F.; Keates R.; Lavian T.; Monga I.; Schofield B.; Nortel Technical Journal, February 2005, pp. 23-26.
- *Optical Network Infrastructure for Grid, Draft-ggf-ghpn-opticalnets-1*. Dimitra Simeonidou, Reza Nejabati, Bill St. Arnaud, Micah Beck, Peter Clarke, Doan B. Hoang, David Hutchison, Gigi Karmous-Edwards, Tal Lavian, Jason Leigh, Joe Mambretti, Volker Sander, John Strand, Franco Travostino, Global Grid Forum(GGF) GHPN Standard GFD-I.036 August 2004.
- *Popeye - Using Fine-grained Network Access Control to Support Mobile Users and Protect Intranet Hosts*. Mike Chen, Barbara Hohlt, Tal Lavian, December 2000.
- Open Networking - Better Networking through Programmability, Open Networking - Better Networking through Programmability

Presentations and Talks
(Not an exhaustive list)

- Lambda Data Grid
- A Platform for Large-Scale Grid Data Service on Dynamic High-Performance Networks
- Lambda Data Grid: An Agile Optical Platform for Grid Computing and Data-intensive Applications.
- Workflow Integrated Network Resource Orchestration
- DWDM-RAM: DARPA-Sponsored Research for Data-Intensive Service-on-Demand Advanced Optical Networks
- Impact of Grid Computing on Network Operators and HW Vendors
- Web Services and OGSA
- WINER Workflow Integrated Network Resource Orchestration.
- A Grid Proxy Architecture for Network Resources
- Technology & Society
- Abundant Bandwidth and how it affects us?
- Active Content Networking (ACN)
- DWDM-RAM: Enabling Grid Services with Dynamic Optical Networks
- Application-engaged Dynamic Orchestration of Optical Network Resources
- DWDM-RAM: DARPA-Sponsored Research for Data-Intensive Service-on-Demand Advanced Optical Networks
- An Architecture for Data-Intensive Service Enabled by Next Generation Optical Networks
- A Platform for Data-Intensive Services Enabled by Next Generation Dynamic Optical Networks
- A Platform for Data-Intensive Services Enabled by Next Generation Dynamic Optical Networks
- Optical Networks
- Grid Optical Network Service Architecture for Data-Intensive Applications
- Optical Networking & DWDM
- OptiCal Inc.
- OptiCal & LUMOS Networks
- Optical Networking Services
- Optical Networks
- Business Models for Dynamically Provisioned Optical Networks
- Business Model Concepts for Dynamically Provisioned Optical Networks
- Optical Networks Infrastructure
- Research Challenges in agile optical networks
- Services and Applications' infrastructure for agile optical networks
- Impact on Society
- Technology & Society
- TeraGrid Communication and Computation
- Unified Device Management via Java-enabled Network Devices
- Active Network Node in Silicon-Based L3 Gigabit Routing Switch
- Enabling Active Flow Manipulation (AFM) in Silicon-based Network Forwarding Engines
- Enabling Active Flow Manipulation (AFM) in Silicon-based Network Forwarding Engines

- Active Nets Technology Transfer through High-Performance Network Devices
- Enabling Active Networks Services on A Gigabit Routing Switch
- Programmable Network Node: Applications
- Open Innovation via Java-enabled Network Devices
- Practical Considerations for Deploying a Java Active Networking Platform
- Open Programmable Architecture for Java-enabled Network Devices
- Enabling Active Flow Manipulation In Silicon-based Network Forwarding Engines
- Enabling Active Flow Manipulation In Silicon-based Network Forwarding Engines
- Enabling Active Flow Manipulation In Silicon-based Network Forwarding Engines
- DWDM-RAM: DARPA-Sponsored Research for Data-Intensive Service-on-Demand Advanced Optical Networks
- DWDM-RAM: DARPA-Sponsored Research for Data-Intensive Service-on-Demand Advanced Optical Networks
- Open Programmable Architecture for Java-enabled Network Devices
- Open Java-based Intelligent Agent Architecture for Adaptive Networking Devices
- Edge Device Multi-unicasting for Video Streaming
- Intelligent Network Services through Active Flow Manipulation
- Java SNMP Oplet
- Unified Device Management via Java-enabled Network Devices
- Dynamic Classification in a Silicon-Based Forwarding Engine
- Integrating Active Networking and Commercial-Grade Routing Platforms
- Enabling Active Flow Manipulation In Silicon-based Network Forwarding Engines
- Open Distributed Networking Intelligence: A New Java Paradigm
- Open Networking Better Networking Through Programmability
- Open Networking
- Open Programmability
- Active Networking On A Programmable Networking Platform
- Open Networking through Programmability
- Open Programmable Architecture for Java-enabled Network Devices
- Popeye – Fine-grained Network Access Control for Mobile Users
- Integrating Active Networking and Commercial-Grade Routing Platforms
- Active Networking
- Programmable Network Devices
- Open Programmable Architecture for Java-enabled Network Devices
- To be smart or not to be?

Exhibit B

Re: Call with Mihai went smoothly

Get Messages | Write | Tag

From Alice Ku <allyku@gmail.com>

Reply | Reply All | Forward | Archive | Junk | Delete | More

To Harald Herchen <haraldherchen@gmail.com>

11/29/19, 3:01 PM

Subject **Re: Call with Mihai went smoothly**

Hello Handsome Harald!

Thank you for the update.

I got here ok.

Since you will be out at your sister's wedding on my birthday, can you please change my flight to one week later...

Let me know the new time, thank you.

Love,
Alice

On Fri, Nov 29, 2019, 5:11 AM Harald Herchen <haraldherchen@gmail.com> wrote:

> Hello Beautiful!
>
> I just finished the call with Mihai. It went smoothly.
>
> He said he will have the new build ready for us on Monday.
>
> Hopefully you are having a smooth trip, I'll see you at the airport Sunday morning. Leaves at 11:30 AM, so we can meet at the lounge between 9:30 AM and 10:00 AM like last time.
>
> I love you!
> Harald

raellic@mail.andrewwatters.com is up to date

Exhibit C

Source of: file:///Users/awatters/Downloads/2022-08-29-093931-Re_%20Call%20with%20Mihai%20went%20smoothly.eml?type=application/x-message-display -...

```
Delivered-To: haraldherchen@gmail.com
Received: by 2002:ac8:3619:0:0:0:0:0 with SMTP id m25csp17477475qtb;
        Fri, 29 Nov 2019 15:01:16 -0800 (PST)
X-Received: by 2002:a67:f708:: with SMTP id m8mr33974195vso.173.1575068476422;
        Fri, 29 Nov 2019 15:01:16 -0800 (PST)
ARC-Seal: i=1; a=rsa-sha256; t=1575068476; cv=none;
        d=google.com; s=arc-20160816;
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From: Alice Ku <allyku@gmail.com>
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Subject: Re: Call with Mihai went smoothly
To: Harald Herchen <haraldherchen@gmail.com>
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Hello Handsome Harald!

Thank you for the update.

I got here ok.

Since you will be out at your sister's wedding on my birthday, can you
please change my flight to one week later...

Let me know the new time, thank you.

Love,
Alice

On Fri, Nov 29, 2019, 5:11 AM Harald Herchen <haraldherchen@gmail.com>
wrote:

> Hello Beautiful!
>
> I just finished the call with Mihai.  It went smoothly.
>
> He said he will have the new build ready for us on Monday.
>
> Hopefully you are having a smooth trip, I'll see you at the airport Sunday
> morning.  Leaves at 11:30 AM, so we can meet at the lounge between 9:30 AM
> and 10:00 AM like last time.
>
> I love you!
> Harald
>

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></div><div dir=3D"auto">I got here ok.</div><div dir=3D"auto"><br></div><d=
iv dir=3D"auto">Since you will be out at your sister&amp;#39;s wedding on my bi=
rthday, can you please change my flight to one week later...</div><div dir=
=3D"auto"><br></div><div dir=3D"auto">Let me know the new time, thank you.<=
/div><div dir=3D"auto"><br></div><div dir=3D"auto">Love,</div><div dir=3D"a=
uto">Alice</div></div><br><div class=3D"gmail_quote"><div dir=3D"ltr" class=
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<br></div><div>He said he will have the new build ready for us on Monday.</=
div><div><br></div><div>Hopefully you are having=C2=A0a smooth trip, I&amp;#39;=
ll see you at the airport Sunday morning.=C2=A0 Leaves at 11:30 AM, so we c=
an meet at the lounge between 9:30 AM and 10:00 AM like last time.</div><di=
v><br></div><div>I love you!</div><div>Harald</div></div>
</blockquote></div>

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