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13 PI-LIEN KUO, AND ASSIGNEE GEORGE KU

14 **SUPERIOR COURT OF CALIFORNIA, COUNTY OF SANTA CLARA**
15 **UNLIMITED JURISDICTION**

16 **WEICHIAO KU and PI-LIEN KUO,**)

Case No. 21CV376210

17 **Plaintiffs,**)

18 **v.**)

**DECLARATION OF DR. TAL LAVIAN
IN OPPOSITION TO DEFENDANT'S
MOTION FOR SUMMARY JUDGMENT**

19 **HARALD HERCHEN, et al.**)

20 **Defendants.**)

**Dept.: 20
Judge: Hon. Socrates Manoukian**

Hearing Date: December 8, 2022

Hearing Time: 9 a.m.

1 I, Tal Lavian, declare:

2 1. I am over the age of eighteen years and I have personal knowledge of the matters stated herein.

3 If called as a witness, I would competently attest thereto.

4 **QUALIFICATIONS**

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

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

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

19 5. In 2016, VisuMenu, Inc. was rebranded as Aybell. At Aybell, I have facilitated the design,
20 architectural development, and implementation of a cloud data center for connecting any
21 smartphone user to any company and service by digitizing interactive voice systems and
22 exposing them through cloud-service application programming interfaces to other applications.
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- 1 6. In 2008, I was a Network Communications Consultant for Ixia, a computer and wireless
2 networking company. At Ixia, I researched and developed advanced network communications
3 technologies.
- 4 7. From 1996 to 2007, I held several roles for Nortel Networks, a telecommunications and
5 networking equipment company. I was a Principal Scientist, Principal Architect, Principal
6 Engineer, and Senior Software Engineer. And I was the Principal Investigator for the U.S.
7 Department of Defense Projects. In this role, I conceived, proposed, and completed three
8 research projects—active networks, DWDM-RAM, and a networking computation project for
9 the Air Force Research Lab.
- 10 8. At Nortel Networks, I was also an Academic and Industrial Researcher. In this role, I designed
11 software for switches, routers, and network communications devices and developed systems and
12 architectures for switches, routers, and network management.
- 13 9. From 1987 to 1995, I worked for three voice and data communication and software/hardware
14 companies—Aptel Communications, Scitex Ltd., and Shalev. In these roles, I developed a
15 mobile wireless device, designed and managed a personal communication network and personal
16 communication system, invented and implemented a two-way paging product, developed system
17 and network communications in C/C++, and developed real-time software and algorithms in
18 C/C++ and Pascal.
- 19 10. Further, I have served as an industry fellow and lecturer at the UC Berkeley College of
20 Engineering, Sutardja Center for Entrepreneurship. I have co-authored over 25 scientific
21 publications, journal articles, and peer-reviewed papers.
- 22 11. I am a member of several professional organizations, including the Association of Computing
23 Machinery (“ACM”) and the Institute of Electrical and Electronics Engineers (“IEEE”) (senior
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1 member). I am also certified under the IEEE Wireless Communications Engineering
2 Technologies (“WCET”) 2012 Program, specifically designed by the IEEE Communications
3 Society (“ComSoc”) to address the worldwide wireless industry’s growing and ever-evolving
4 need for qualified communications professionals.
5

6 12. I received a B.S. degree in Mathematics and Computer Science from Tel Aviv University in
7 1987, an M.S. degree in Electrical Engineering from Tel Aviv University in 1996, and a Ph.D. in
8 Computer Science specializing in network communications from UC Berkeley in 2006.

9 13. I have testified in Federal courts, the PTAB, and the ITC on behalf of leading companies such as
10 Amazon, LinkedIn, AT&T, Sprint, Cisco Systems, Juniper Networks, Motorola, HP, LG,
11 Samsung, and Apple. And I testified in over 80 depositions on network communications and
12 telecommunications, including Internet protocols, streaming media, and mobile wireless
13 technologies. Furthermore, I have served as an expert witness in over 140 patent-related cases
14 where I wrote expert reports.
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16 14. I am an inventor of over 120 patents, 60 of which I prosecuted pro se before the USPTO.
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18 15. I have published many peer-reviewed articles and publications on network technology, a
19 relevant sampling of which includes: "Implementation of a Quality of Service Feedback Control
20 Loop on Programmable Routers" at the 12th IEEE International Conference on Networks 2004,
21 "Practical Active Network Services within Content-Aware Gateways" at the proceeding of the
22 DARPA Active Networks Conference and Exposition, 2002, and "Active Networking on a
23 Programmable Network Platform" at the Fourth IEEE Conference on Open Architectures and
24 Network Programming.
25

26 16. I have spent over a decade as an academic and industrial researcher. I have worked researching
27 and developing many projects during that time, partly through heading research collaboration
28

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

5
6 17. I am a member of several professional organizations, including the IEEE Communications
7 Society (COMMSOC), the ACM Special Interest Group on Data Communication (SIGCOM),
8 the IEEE Consultants' Network (CNSV), and the Global Member of the Internet Society
9 (ISOC).

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

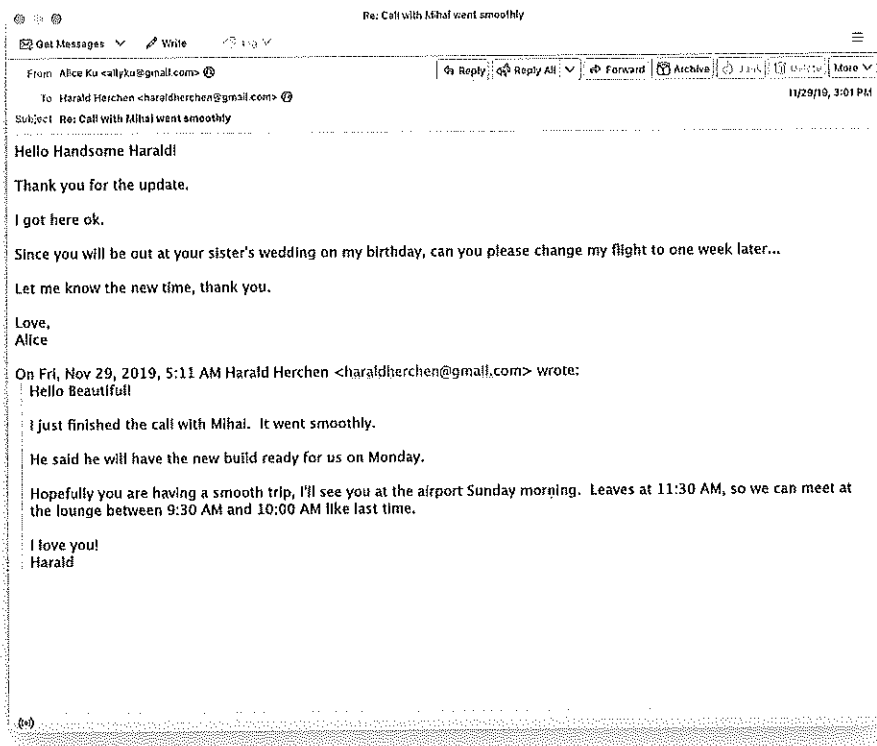
16
17 19. Based on my above-described over three decades of experience in network resource allocation
18 and the acceptance of my publications and professional recognition by societies in my field, I
19 believe that I am qualified to be an expert in the field of network technology.

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

1 24. Using any common, widely-used, email application (e.g., Microsoft Outlook) that comes free
2 and pre-installed on even the most basic laptop, the average user can see an email's raw source,
3 headers, and unique identifiers. Specialized software and in-depth knowledge or training to view
4 raw headers and associated unique identifiers are not required. Raw headers are available for
5 viewing to anyone with access to the original email or a complete copy thereof.
6

7 25. As part of the discovery process, the Plaintiffs' counsel obtained the November 29, 2019, email
8 directly from the Defendant, who produced the email as an electronic file attachment. The
9 Plaintiffs' counsel also separately subpoenaed Google for the same Gmail message and
10 indicated to me that they received the email message headers and IP address.
11

12 26. Google also produced other unique identifiers of the email – (1) the IP address of the network
13 through which the email message was submitted and (2) the SMTP ID¹ of the email, which is
14 used to link an email to an IP address of the sending and receiving network.
15

16 27. IP addresses in the IPv4 format are assigned to telecom entities in a process administered by the
17 Internet Assigned Numbers Authority (IANA). IP addresses are traceable, unique, and are not
18 replicated or otherwise altered by the recipient of an email. It is analogous to a street address
19 which is unique. SMTP IDs are also unique and are not replicated or otherwise altered by the
20 user, as they are stored on the email server through automated processes.
21

22 28. By matching an email's raw headers and unique identifiers – the sender and recipient's email
23 addresses, transmission timestamps, the email's SMTP ID, and the IP address of the network
24 used to send an email – an average consumer, without specialized training, education or
25 software, can view these identifiers using commonly available, free, and pre-installed email
26

27
28 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):

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Source of file://Users/awalters/Downloads/2022-08-20-092931-Pr_5%2BCall%2Dwith%2DHilal%2Dwent%20smoothly.eml?type=application/x-message-display...
References: <CAK8QWfRp_CD0E0C0CKf6y0fYh8k87e665jgusaxzrg1sHa-A@mail.gmail.com>
In-Reply-To: <CAK8QWfRp_CD0E0C0CKf6y0fYh8k87e665jgusaxzrg1sHa-A@mail.gmail.com>
From: Alice Ku <aliceku@msa.com>
Date: Fri, 29 Nov 2019 15:01:03 -0800
Message-ID: <CAK8QWfRp_CD0E0C0CKf6y0fYh8k87e665jgusaxzrg1sHa-A@mail.gmail.com>
To: Harald Herchen <haraldherchen@gmail.com>
Content-Type: multipart/alternative; boundary="000000000000fdec8805988434ac"

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

Hallo 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 Nihai. 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">Hallo Handsome Harald!</div><div dir=3D"auto"><br></div><div dir=3D"auto">Thank you for the update.</div><div dir=3D"auto"><br></div><div dir=3D"auto">I got here ok.</div><div dir=3D"auto"><br></div><div dir=3D"auto">Since you will be out at your sister's wedding on my birthday, 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"auto">Alice</div></div><div class=3D"mail_quote"><div dir=3D"ltr" class=3D"mail_attr">On Fri, Nov 29, 2019, 5:11 AM Harald Herchen <mailto:haraldherchen@gmail.com> wrote:
"mailto:haraldherchen@gmail.com" rel=3D"nofollow" nofollow="true" target=3D"blank">haraldherchen@gmail.com</div><div class=3D"mail_quote" style=3D"margin:0 0 0 .8em;border-left:1px #ccc solid;padding-left:1em"><div dir=3D"ltr">Hello Beautiful!
I just finished the call with Nihai. 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
</div></div>

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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.

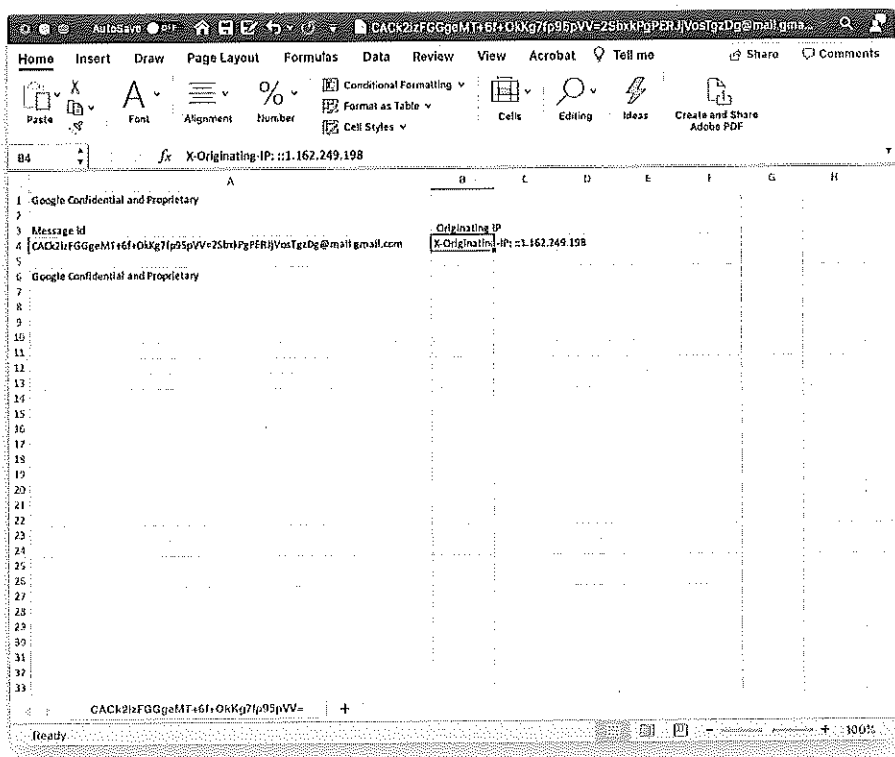
30. The November 29, 2019 email was produced electronically by the Defendant, and separately by Google. The electronic file produced by the Defendant contains full email headers showing

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

4
 5 31. The electronic file produced by the Defendant and Google shows the same unique SMTP ID:

6 <CACK2izFGGgeMT+6f+OkKg7fp95pVV=2SbxkPgPERJjVosTgzDg@mail.gmail.com>

7 The ID was used to obtain the originating IP address of the email, which is the computer
 8 network from which the email was sent:
 9

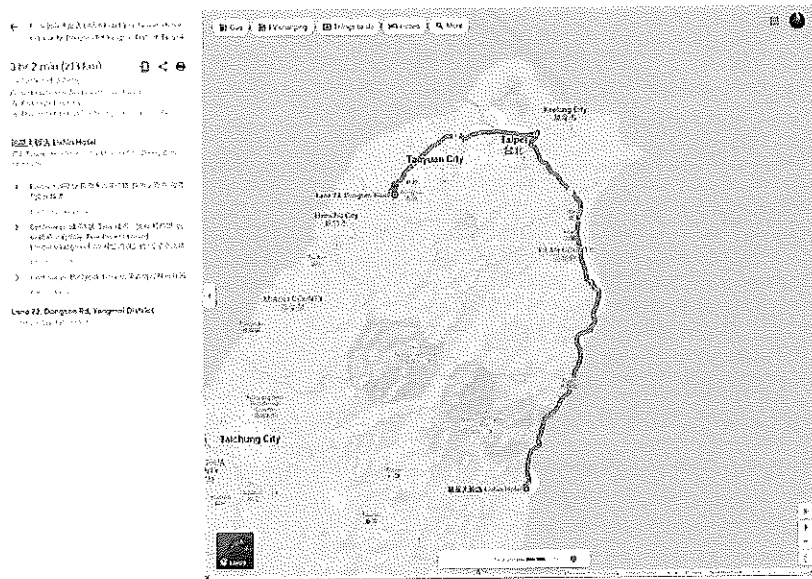


23
 24 32. The originating IP address of the November 29, 2019, email was produced by Google in
 25 response to a subpoena, as discussed in Mr. Watters's declaration. The originating IP address of
 26 the November 29, 2019 email was **1.162.249.198**, which belongs to the HiNet network in
 27
 28

Taiwan and is reportedly the hotel Wi-Fi at the hotel in Hualien² 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.

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

4
5 36. The next notable fact is from the first line in the long headers, above the short headers:

6 In-Reply-To:

7 <CAKByDNfrp_CdO6cQ8GXFdyDUyN0kB7eW6sjgusaxZrgJs+Ma=A@mail.gmail.com>

8 This line indicates that the message sent from Ms. Ku's account was a reply to a message that
9 was in her inbox, specifically the message with the referenced SMTP ID. That message was the
10 message from Defendant that was quoted in the November 29, 2019, email. The reference
11 shows that the November 29, 2019, email was a reply, which explains why the quoted message
12 shows as having been read. In other words, the quoted message is not "unread" because it was
13 replied to, and therefore someone clicked on Defendant's prior message in order to reply to it. It
14 is possible to reply to a message and then re-mark it as unread, but this did not occur here
15 because the Gmail production shows the message as read.
16

17
18 37. The final three lines in the email are also relevant:

19 Delivered-To: haraldherchen@gmail.com

20 Received: by 2002:ac8:3619:0:0:0:0 with SMTP id m25csp17477475qtb;

21 Fri, 29 Nov 2019 15:01:16 -0800 (PST)

22 X-Received: by 2002:a67:f708:: with SMTP id m8mr33974195vso.173.1575068476422;

23 Fri, 29 Nov 2019 15:01:16 -0800 (PST)

24
25
26 The first line shows the final delivery recipient—Defendant, who also uses Gmail.

27 The second line shows the email server that received this message. Although I am not familiar
28

1 with Google’s internal email architecture—a trade secret—the IP address
2 2002:ac8:3619:0:0:0:0:0 is a private, reserved address which would be used internally at
3 Google. The same goes for IP address 2002:a67:f708:: -- in other words, because both
4 Defendant and Ms. Ku used Gmail, the email was sent entirely within Google’s systems and did
5 not exit Google. Therefore, no external IP addresses are shown in the headers.
6

7
8 **SUMMARY**

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

10 A. The November 29, 2019, email was sent from the hotel where Counsel advised me that
11 the Defendant testified he was staying by himself on the night of the Decedent’s
12 disappearance. The IP address of the email is that of the hotel Wi-Fi, which is where the
13 Decedent’s email account was logged in.
14

15 B. The November 29, 2019, email was sent from the Decedent’s account on Gmail, using
16 the web interface of Gmail on a device from which the Decedent was still logged into
17 Gmail.
18

19 C. At first glance, the November 29, 2019, email appears to have taken an unexpectedly
20 long time (10-12 seconds) to transmit from Taiwan back to Taiwan. However, it is more
21 likely that the device in question was not automatically synchronizing its timestamp and
22 the time setting on the device was simply off by 10 to 12 seconds. Typically, a phone
23 will automatically sync frequently by the cellular service provider (and not by the phone
24 owner manually). If you have a U.S. phone, and you land in Taiwan, when you get the
25 local cellular service, the phone is automatically synchronized to the local time. Unlike a
26 cellphone that is time-synchronized with the local cellular service, on a laptop or desktop
27
28

1 the time configuration is done by the user. The user can manually change the time-zone.
2 In addition, the user can manually set the time (in addition to the time zone) or turn
3 on/off the synchronization with a network time server. So, the inference I have drawn is
4 that the November 29, 2019, email was sent from a laptop or desktop computer that was
5 not automatically syncing with a network time server and had not been manually set to
6 Taiwan time. Counsel advised me that Defendant testified that he brought his work-
7 issued laptop to Taiwan on that trip. Counsel advised me that there was also a laptop
8 computer of the Decedent in Defendant's possession at some point, although Defendant
9 indicated at one of the depositions that the Decedent did not bring the laptop to Taiwan.
10 It would have been more difficult to send the November 29, 2019, email from a phone
11 without raising suspicion for several reasons, starting with the fact that an email from a
12 phone would likely have been from a Taiwanese mobile phone provider's computer
13 network/IP range, rather than the hotel Wi-Fi, and the timestamp would have been
14 accurate.
15
16

17
18 D. There was no subsequent Gmail logout from the device that sent the November 29, 2019
19 email.

20 The November 29, 2019 email cannot have been sent by the Decedent, because (1) the
21 parents' IP address is not the originating IP address of the email as indicated above (the
22 parents' IP address also maps to the other side of Taiwan), (2) Counsel advised me that
23 according to her parents, the Decedent had not, in fact, arrived at her parents' house, (3)
24 Counsel advised me that the parents' house is several hours away from the hotel by train or
25 car on the other side of Taiwan, and there is no possibility that the hotel Wi-Fi IP address is
26 the parents' IP address. Counsel advised me that this is in addition to the fact that the
27
28

1 parents reportedly had no idea the Decedent was in Taiwan and were not expecting her. The
2 email in question came from the hotel Wi-Fi in Hualien. Accordingly, someone in the hotel
3 or on the hotel Wi-Fi (as triple-confirmed by the login/logout history, the email IP address
4 produced by Google, and otherwise) is the only person who could have sent the November
5 29, 2019 email.
6

7 I declare under penalty of perjury under the laws of the State of California that the foregoing is true and
8 correct.
9

10 Date: November 22, 2022

DocuSigned by:
Tal Lavian 11/22/2022 | 10:02:24 AM PST
88EA69B7A94C472...

11
12 Dr. Tal Lavian
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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)

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

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

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

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

Patent Applications Published and Pending
(Representative List)

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

Transfers

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

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

Publications

(Representative List)

- "R&D Models for Advanced Development & Corporate Research" Understanding Six Models of Advanced R&D - Ikhtlaq 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 2013 ISBN 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.; Dasgupta 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.; Dasgupta 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.; Dasgupta, 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.
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- 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.
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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](#)
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- [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

11/29/19, 3:01 PM

To Harald Herchen <haraldherchen@gmail.com>

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%20Mihal%20owent%20smoothly.eml?type=application/x-message-display ...

Delivered-To: haraldherchen@gmail.com
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Fri, 29 Nov 2019 15:01:16 -0800 (PST)
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Fri, 29 Nov 2019 15:01:16 -0800 (PST)
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Return-Path: <allyku@gmail.com>
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for <haraldherchen@gmail.com>
(Google Transport Security);
Fri, 29 Nov 2019 15:01:16 -0800 (PST)
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Fri, 29 Nov 2019 15:01:15 -0800 (PST)
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References: <CAKByDNfrp_Cd06cQ8GXfDyDUYn0k87eW6sJgusaxZrgJs+Ma=A@mail.gmail.com>
In-Reply-To: <CAKByDNfrp_Cd06cQ8GXfDyDUYn0k87eW6sJgusaxZrgJs+Ma=A@mail.gmail.com>
From: Alice Ku <allyku@gmail.com>

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

References: <CAKkByDnfrp_Cd06c08GXfDyN0kB7eW6sJgusaxZrgJs+Ma=A@mail.gmail.com>
In-Reply-To: <CAKkByDnfrp_Cd06c08GXfDyN0kB7eW6sJgusaxZrgJs+Ma=A@mail.gmail.com>
From: Alice Ku <allyku@gmail.com>
Date: Fri, 29 Nov 2019 15:01:03 -0800
Message-ID: <CAKk2izFGGgeMTf+6f+0kKg7fp95pVv=2SbxkPgPERJjVosTgzDg@mail.gmail.com>
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Content-Type: text/plain; charset="UTF-8"

Hello Handsome Harald!

Thank you for the update.

I got here ok.

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Love,
Alice

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>
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>
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>
> 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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Content-Transfer-Encoding: quoted-printable

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</div><div dir=3D"auto">Thank you for the update.</div><div dir=3D"auto">
</div><div dir=3D"auto">I got here ok.</div><div dir=3D"auto">
</div><div dir=3D"auto">Since you will be out at your sister's wedding on my birthday, can you please change my flight to one week later...</div><div dir=3D"auto">
</div><div dir=3D"auto">Let me know the new time, thank you.</div><div dir=3D"auto">
</div><div dir=3D"auto">Love,</div><div dir=3D"auto">Alice</div></div><div class=3D"gmail_quote"><div dir=3D"ltr" class=3D"gmail_attr">On Fri, Nov 29, 2019, 5:11 AM Harald Herchen haraldherchen@gmail.com> wrote:
</div><div class=3D"gmail_quote" style=3D"margin:0 0 0 .8ex;border-left:1px solid;padding-left:1ex"><div dir=3D"ltr">Hello Beautiful!
</div><div dir=3D"ltr">I just finished the call with Mihai. It went smoothly.</div><div dir=3D"ltr">He said he will have the new build ready for us on Monday.</div><div dir=3D"ltr">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.</div><div dir=3D"ltr">I love you!</div><div dir=3D"ltr">Harald</div></div></div></div>

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