Appendix A
Call to Order – Welcome and Introduction
Preston Grubbs, Chairman

Introduction of EAB Members & Chairman’s Remarks
Preston Grubbs, Chairman

NDCAC Update
Marybeth Paglino, NDCAC Director
  • Review of NDCAC activity since last meeting and planned projects

Presentation of NDCAC Law Enforcement Learning Pathways
Brian Durham, NDCAC staff

Overview of 5G Wireless Technology
Kenneth Coon, NDCAC staff

Report of the Administrative Subcommittee
Derrick Driscoll, Subcommittee Chairman
  • Member Status
  • Status of NDCAC Director and Deputy Director

Report of the Technology Subcommittee
Michael Sachs, Subcommittee Chairman
  • Activity since last meeting
  • Report to the Attorney General

Acknowledgement of Submitted Comments
Preston Grubbs, Chairman

Establishing EAB Schedule of Future Meetings
Alice Bardney-Boose, Designated Federal Officer

Adjournment
Appendix B
## NDCAC EAB Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Alice Bardney-Boose†</td>
<td>Designated Federal Officer</td>
<td>Federal Bureau of Investigation</td>
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<tr>
<td>Christopher Bubb†</td>
<td>Attorney, Office of the General Counsel (OGC)</td>
<td>Federal Bureau of Investigation</td>
</tr>
<tr>
<td>Michael D’Ambrosio</td>
<td>Deputy Assistant Director, Office of Investigations</td>
<td>US Secret Service</td>
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<tr>
<td>Derrick Driscoll</td>
<td>Acting Deputy Director</td>
<td>United States Marshals Service</td>
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<tr>
<td>Alysa Erichs</td>
<td>Acting Executive Associate Director</td>
<td>Immigration and Customs Enforcement</td>
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<tr>
<td>G. Clayton Grigg</td>
<td>Assistant Director, Laboratory Division</td>
<td>Federal Bureau of Investigation</td>
</tr>
<tr>
<td>Preston Grubbs</td>
<td>Principal Deputy Administrator</td>
<td>Drug Enforcement Administration</td>
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<tr>
<td>Mark A. Keel</td>
<td>Chief, South Carolina Law Enforcement Division</td>
<td>Association of State Criminal Investigative Agencies</td>
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<tr>
<td>Lenny Millholland*</td>
<td>Sheriff, Frederick County Sheriff’s Office</td>
<td>National Sheriffs Association</td>
</tr>
<tr>
<td>Christopher Noelck</td>
<td>Special Agent in Charge, Iowa Division of Intelligence / Fusion Center, Iowa Department of Public Safety</td>
<td>National Narcotics Officers' Associations' Coalition</td>
</tr>
<tr>
<td>Thomas G. Ruocco</td>
<td>Assistant Director/Chief, Criminal Investigations Division, Texas Department of Public Safety</td>
<td>International Association of Chiefs of Police</td>
</tr>
<tr>
<td>Michael Sachs</td>
<td>Executive Assistant District Attorney, County of New York District Attorney’s Office</td>
<td>Association of Prosecuting Attorneys</td>
</tr>
<tr>
<td>Henry Stawinski*</td>
<td>Chief of Police, Prince George’s County</td>
<td>Major City Chiefs</td>
</tr>
<tr>
<td>Paul Vanderplow</td>
<td>Chief, Special Operations Division</td>
<td>Bureau of Alcohol, Tobacco, and Firearms</td>
</tr>
<tr>
<td>Brian Young**</td>
<td>Representing Chief Privacy and Civil Liberties Officer, ODAG</td>
<td>Department of Justice</td>
</tr>
<tr>
<td>Edmond Zabin</td>
<td>Chief of Homicide, Suffolk County District Attorney’s Office</td>
<td>National District Attorneys Association</td>
</tr>
</tbody>
</table>

† Non-Voting Member
* Participated via teleconference
** Attended on behalf of EAB Member Peter Winn
Appendix C
Members of the Public in Attendance

Robert Alexander
Charles Beaumont
Kenneth Coon
Brian Durham
Louis Grever
Jonah Force Hill
Nisha Kumar
Tracey Mendet
Paul Mueller
Evan Nicholas
Jeff Tyler
Appendix D
National Domestic Communications Assistance Center (NDCAC)

Program Update

Marybeth Paglino
Director, NDCAC

May 1, 2019
NDCAC Budget

• NDCAC’s Fiscal Year Budgets
  – 2020: $9,759,606 (Proposed)
  – 2019: $10,987,055
  – 2018: $10,987,055
  – 2017: $11,441,998
  – 2016: $11,701,998
  – 2015: $12,201,918
  – 2014: $12,201,918 Sequestration Cut
  – 2013: $13,147,740 Annualization
  – 2012: $8,244,000

• The NDCAC’s expenditures include:
  – Contracted personnel
    – Technology Sharing / Tool Development
    – Technical Analysis
    – Solution Verification
    – Technical Resource / Helpdesk
  – Training / Student Expenses and Conferences
  – Outreach
  – Equipment, Facility, Network, Website
New Project – Legal Demand

• Automated delivery of criminal legal process
  – Grand Jury Subpoenas
  – Criminal Subpoenas

• Request Service Provider for records, with a product return directly to law enforcement
  – Subscriber
  – Types of Service
  – Toll records

• NDCAC received no-year funding exclusively for this effort
  • Received $1.478M, requested $2.7M, remaining funds uncertain

• Initial requirements from members of the Law Enforcement Technical Forum (LETF)

• Currently planning for requirements gathering from Executive Advisory Board (EAB) Technical Subcommittee
NDCAC – Other News

• NDCAC mentioned in letter to FBI (from U.S. Senators Tillis and Schatz)
  – Seeking information on how the FBI plans to prepare law enforcement officials to effectively access and analyze digital evidence in support of criminal investigations
  – Request based on CSIS Report

• FBI (OTD) reorganization
  – Re-alignment of resources to better address investigative technology needs
  – NDCAC now reporting to a Section Chief
Technical Resource Group

- Provide assistance and technical referrals to law enforcement clients – currently more than 20,000

- Six month trend in number of clients: increase of 2,660

- Types of calls handled by the TRG
  - Access requests for NDCAC services and website
  - Interpretation of provider call detail records / cell tower information, including geo-location records
  - Assisting in correlating service provider information
  - Assistance with legal demand (templates)

- Number of requests over the last six months: 7,576 (1,155 via website)
Training

• Since the EAB last met, NDCAC has provided training to nearly 2,200 law enforcement representatives
  – Utilizing Open Source/Social Media Information for Investigations
  – Gathering Evidence From Today’s Communication Technologies
  – Regional Understanding Investigative Techniques for Modern Telecommunications Course
  – “Train the Trainers” and “Best Practices” course for devices
Training in Development

• NDCAC Tool Courses
  – Cover each NDCAC tool separately and in-depth
  – Tool’s primary function and how it assists in investigations
  – How to get the tool, what system to have in place to effectively use the tool
  – Hands-on exercises to develop the necessary knowledge, skills, and abilities to utilize the tool

• Location-based Services Training
  – Interactive demonstrations and case studies
  – Covers current and future technologies (e.g., 4G and 5G)
  – Encompasses four major U.S.-based cellular providers, significant web-based companies, and notable mobile applications
  – Records available based on industry segment
Outreach – Law Enforcement

• The NDCAC continues to proactively reach out and educate the law enforcement community about it’s support, tools, and training… in the last six months: nearly 2,000 participants from over 300 agencies

• Proactive Outreach – introduction of the NDCAC and overview of Gathering Evidence from Today's Communication Technologies
  – Newtown PA  Skokie IL  Carrollton GA
  – Henrico TX  McDonough GA  Chicago IL
  – Columbus OH  Clayton MO  Kansas City MO

• Participation in established forums
  – Law Enforcement Intelligence Network (LEIN)
  – West Texas High Intensity Drug Trafficking Area (HIDTA)
  – Southeast National Technical Investigators' Association (NATIA)
  – NRO LEO Conference
  – International Homicide Association Advanced Homicide Conference
  – Florida Department of Law Enforcement Analyst Conference

May 1, 2019
Communications Applications

- NDCAC has collected information on communications applications and makes it available through its App Catalog
  - Type of legal process required
  - Information collected during sign-up
  - Information that may be available from service providers
  - Templates

![Bar chart showing total apps, unique apps, tickets, infotainment, and IOT for FY18, FY19, and FY19 projection.]

May 1, 2019
Website

- Secure portal for US law enforcement to access a wide variety of NDCAC products and services
- FY19 Total unique users to date: 5,602
  - Top 3 Downloaded Documents:
    o Reverse Location Search SW - v2 CCIPS.docx (1,187)
    o Technology Best Practices.pptx (611)
    o Reverse Location Search Job Aid.pdf (494)
  - Top 3 Sections:
    o Tools (13,753)
    o Training (7,418)
    o Providers (7,028)
  - Top 3 Tool Downloads:
    o .Social (1,665)
    o CASTViz (1,640)
    o CrossTalk (604)
Website

- Undergoing a transformation to enhance users’ learning experience
- Law enforcement needs to become proficient
  - Understand service and technology impacts
  - Templates tailored by service / provider
- Website clients progress into deeper levels of detail at their discretion and own pace
Appendix E
Learning Pathways
How
What
Obtaining Provider Records

How can we help?
We want to help support your investigation by sharing electronic evidence collection methods and best practices. But we know you might have a few questions. Read on for details about identifying providers, collecting information, and more.

Reverse Location Records
- Reverse Location Search
- Cellular Networks and Handset Based Positioning
- How to Request Records
- How to Analyze Records
- Tips
- Learn more >

Voice/Text Records
- Determine Provider
- Historical Records (Subscriber/CDRs)
- How to Request Records
- Identifying an iMessage User
- Tips
- Learn more >

Internet Service Records
- Recognize IP Addresses
- Determine Provider
- IP Address Attribution
- Historical Records
- Tips
- Learn more >

Email Records
- Investigating Email Records
- Historical Records
- How to Request Records
- Email Attribution
- How to Identify an Account
- Learn more >
Obtaining Email Records

Find out how to use an Email Address to identify an account, as well as details on serving legal process to obtain records and more.

How can Investigating Email Records be Valuable to Law Enforcement

- Email can be a starting point or a key element in many investigations. Analyzing a subject’s email can provide you with information such as:
  - Other e-mail messages related to this investigation
  - Sender information
  - IP addresses
  - Date and time information
  - User information
  - Attachments
  - Content of the communications
  - Application logs

- There is a lot of valuable information available in the email header, but you need to know what to look for. By analyzing the extended email header, you can determine the originating IP address, which will help you discover the Internet service provider (ISP) the subject was using when they sent the email. Once you know the ISP used by the subject, you can use various legal processes to obtain records related to the subscriber of the Internet service.

Click Here for additional information on tracing the sender of an email message
Obtaining Internet Service Records

How to Recognize an IPv4 or IPv6 Address

You are likely familiar with IP addresses, which are used to route most Internet traffic when entering or leaving the beginning of the Internet and Internet Protocol. 

Because global demand for IPv4 addresses now exceeds the total number of IPv4 addresses available, a successor protocol, IPv6, was developed to create a much larger inventory of IP addresses that are used interchangeably to route Internet traffic. You will be able to easily identify the difference between an IPv4 and an IPv6 IP address.
Examples of Linked Job Aids

Introduction to ARIN’s Database

ARIN (American Registry for Internet Numbers) is a non-profit organization that manages the allocation of autonomous systems numbers (IN-ORG designations) and the distribution of Internet Protocol (IP) addresses. ARIN's database is one of the largest relational databases with a diverse set of objects, all of which are interconnected to one another in meaningful ways.

Organizations

Example

Job Aid

Org ID: The Org ID is a unique identifier representing an organization that is registered in the ARIN database. This identifier allows ARIN to efficiently manage the database.

Introduction

This job aid provides information about the ARIN database, which is the database used to manage the allocation and distribution of Internet Protocol (IP) addresses. The database contains information about organizations, their networks, and the IP addresses they own. The job aid provides a basic overview of the ARIN database and its structure, along with some examples to illustrate how the database works.

Network-based Investigative Information

This job aid provides information about network-based investigative data. The job aid focuses on the importance of maintaining accurate records and the use of digital evidence in investigative processes. It provides guidelines for handling and preserving digital evidence, as well as information on the types of data that can be obtained from network-based investigative techniques.

Examples of linked job aids include:

- Network-based Investigative Information
- Introduction to ARIN’s Database
- Time Zones Job Aid

These job aids are interconnected, providing comprehensive information on topics related to network investigation, data management, and time zone considerations.
“Three separate times today, for unrelated cases, I passed along another NDCAC gem...I’ve never seen such a concise tool for agents to determine what is possible.”

- Senior Investigator
Appendix F
5G Technology Overview

National Domestic Communications Assistance Center
CALEA Standards Team

- Six Personnel attend various meetings with Industry and Partners (3GPP, ETSI, etc) to support law enforcement

- Working on the following areas of 5G
  - Virtualization
  - Architecture
    - Main components of core network
    - Interworking with other technologies
  - Core Network and Terminals
    - Equipment and Mobility
  - Lawful Intercept
    - Designs all aspects of LI for 3GPP
Objectives of CALEA Standards

- Participate in standards development before technology is a reality
  - Understand the impacts of the technology on law enforcement
  - Raise awareness on industry trends
  - Assure CALEA standards for LI are in place or close to completion when new services and technologies that are covered are deployed

- Continued participation on deployed technologies allows feedback and updates to support law enforcement
  - Monitor developments in existing technologies and get industry feedback
    - New services
    - Changes to interworking
    - Security and Integrity
  - NDCAC has a statutory responsibility to participate in the development of CALEA standards
    - Develop capabilities to address services covered by CALEA
    - Address limitations or operational issues that are experienced after technology deployment
Mobile Technology Background

• The telecommunications industry has continually improved network technologies to keep pace with commercial and consumer needs
  • Evolutions in cellular technology have been measured in “generations” of releases
  • Currently, network providers widely deploy the technologies known as 4th generation, or 4G

• Many industry trends are creating a need for new capabilities within cellular networks

• The next generation of wireless technology – 5G – is designed to address these needs
Timeline of Cellular Technology

1999
- Standardized in 1999
- Full rollout 2004
- ~5 years to implement widely

2008
- Standardized in 2008
- Large scale rollout in 2011-2012
- ~4 years to implement widely

2018
- Standardized in 2018
- Limited network rollout in 2019
- ? years to implement widely
Objectives for 3G and 4G

• 3G
  • Increasing the speed of communication
  • Increased network security
  • Provide various value added services
    • video calling
    • live streaming
    • mobile internet access
    • IPTV

• 4G
  • Seamless connectivity and global roaming across multiple networks
  • High quality of service for next generation multimedia support
    • real time audio
    • high speed data
    • HDTV video content
    • mobile TV
  • Interoperability with existing wireless standards
  • An all IP, packet-switched network
  • IP-based femtocells
Objectives for 5G

- Very low latency and high reliability
  - human-centric communication
  - machine-centric communication
- High user density - Cell size is being reduced (e.g., tens of meters)
- Ultra-accurate positioning applications
- High quality at high mobility (UHD)
- Enhanced multimedia services
- Internet of Things
- Convergence of applications (e.g., e-Gov, e-health) - New market segments
- Global operation and economies of scale
Fixed Broadband and Enhanced Mobile Broadband

- All major wireless carriers have announced plans for both fixed and mobile 5G broadband services
  - This will be the first aspect of 5G consumers experience

Launched fixed wireless broadband service in 2017
- Available in rural parts of 18 states including Alabama, Arkansas and California
- Initial offering is at 10/1 Mbps speeds at a cost of $60 a month, with a monthly cap of 215 gigabytes

Expects to offer nationwide mobile 5G service by the end of 2020
- Initial offerings in parts of 12 cities including Houston, Dallas, Atlanta, Charlotte and New Orleans
- Initially offered to limited customers, but will be open to subscribers in available markets starting in early 2019
  - Using a mobile hotspot only, with mobile phone availability to follow later in the year
  - AT&T pegs peak theoretical speeds for the service at around 1.2 Gbps
Fixed Broadband and Enhanced Mobile Broadband

- All major wireless carriers have announced plans for both fixed and mobile 5G broadband services
  - This will be the first aspect of 5G consumers experience

Launched fixed wireless broadband service in 2018
- Houston, Indianapolis, Los Angeles and Sacramento
- Speeds ranging from 300 Mbps to 1 Gbps

Mobile 5G service launched on April 3rd
- Initial offering in Chicago and Minneapolis with service expanding to more than 30 U.S. cities in 2019
- Initial offering with a snap-on module for the Moto Z3 with a 5G version of the Samsung’s Galaxy S10 to come later
Fixed Broadband and Enhanced Mobile Broadband

- All major wireless carriers have announced plans for both fixed and mobile 5G broadband services
  - This will be the first aspect of 5G consumers experience

Still in the planning phase for 5G rollout
- Long-term strategy tied to the potential Sprint merger

Fixed Service
- No specific launch date for fixed service has been announced
- In a statement to the FCC, T-Mobile said by 2024, it plans to be a fixed 5G option for more than half the ZIP codes in the U.S

Mobile Service
- T-Mobile won’t be launching 5G service in its first 30 cities until the second half of 2019
- T-Mobile is still aiming to deliver nationwide 5G by 2020
Throughput - Things to Consider

• Higher throughput available to consumers to allow more diverse and media rich content

• The combination of high throughput and low latency will allow devices to offload data to the cloud
  • Provide carriers with an opportunity to offer consumers with remote computing services
Latency - Things to Consider

• 5G will allow remote control and robotics over cellular networks

• Interactive games and VR rely on very low latency response for immersion

• New games and services that further entrench technology in culture
  • Application providers will find new and interesting ways to leverage additional capabilities for services

• Automakers’ will leverage 5G networks for autonomous driving and cars telemetry
  • Vehicle location
  • Video/mapping of the environment
  • Audio
Connections - Things to Consider

- IoT will represent a significant portion of traffic and services envisioned on 5G networks
  - Alarm systems
  - Video cameras
  - Activity/Sensor data

- Allows for more robust and creative capabilities in dense environments

- Smaller cells and higher cellular density to allow more connections
  - Location information available to providers for services may be more precise
Mobility - Things to Consider

- 5G will allow drones controlled through cellular
  - Both latency and Mobility/Reliability are essential to make cellular drones possible
  - Several companies have announced intention to use 5G for control of drones and have begun trials
Architecture - Things to Consider

- 5G networks will rely heavily on virtualizing network functions and services
  - What is a network?
  - Carrier may provide a virtual network to a customer, not an individual connection
  - May provide a point-to-point connection between locations
  - MVNO models may be different

- Intelligence and provisioning can be centralized for a multinational network

- Information that may have been maintained by a single provider may now be disbursed
High Level 5G LEA Considerations

• 5G is in the very early stages of deployment
  • Currently more hype than reality
  • LE will first encounter 5G bandwidth
    • Theoretical – how much will subscribers use?
    • Services and broader capabilities to come much later
• New network capabilities will change the way we think of mobile devices and networks
  • These will impact how mobile technology is used and how law enforcement will have to approach them
• New identifiers and more complicated networks will be a challenge for law enforcement
Summary

• 5G is the next generation mobile technology
  • Deployment is starting and it will take years to reach its full potential
  • Goals include
    • Increasing bandwidth
    • Reducing delays
    • Increasing reliability
    • Adaptable networks

• Much of the current discussion around 5G focuses on what will be possible when fully implemented
  • Technology and economic drivers will shape applications and services that are eventually deployed

• Law enforcement will have to adapt to 5G networks they encounter the technology
  • This will be similar to the learning curve when moving from 3G to 4G
  • Standards and CALEA will help shape capabilities available in cellular networks
Appendix G
Law Enforcement Today
- Law enforcement faces many challenges in today’s technology-oriented environment - one of which is the need to anticipate how new communications service and technologies available today can be used in the furtherance of crime
- Law enforcement often does not have timely access to information about providers, services, implementation plans, or the impacts of today’s services on law enforcement - including collection and analysis of digital evidence
- Each agency is unique in its capabilities and resource limitations but there are several commonalities in their respective needs (e.g., access to technical information / solutions, knowledge about service of process, training) that can benefit from getting to know and understand the NDCAC’s unique set of skills and competencies

Benefits provided by the NDCAC
- The NDCAC recognizes staying technologically relevant is a full-time responsibility - it researches, collects, and organizes information often critical to law enforcement investigations
- Develops / maintains / delivers tools to address law enforcement’s technical challenges at no cost to law enforcement agencies
- Leverages training and tools developed by other agencies to share with the community - acting as a force multiplier by distributing solutions for those agencies capable of developing solutions
- Strengthens law enforcement’s relationships with the communications industry through active interaction including technical discussions and service of process consultations

Resources / Tools
- Real time assistance to understand provider-supplied mobile device location information (CDRs)
- Tool for interpreting app provider returns - when delivered information is too voluminous to be usable in a timely way during an investigation
- Open source tool to significantly increase efficiencies of Internet-based searches
- Automated resolution of Internet Protocol (IP) addresses included in communications identifying information

Knowledge Base / Technical Library / Website
- Catalog of information about communications applications, app feature evaluations, technical whitepapers, and instructional videos
- Go-bys of legal process that have been successfully used by agencies
- Industry Points of Contact - one-stop for over 4,000 providers
- Register for training - Best Practices, Collection / Seizure of Mobile Devices for First Responders; Cellular Survey Analysis; Utilizing Open Source and Social Media for Investigations, and more

Technical Resource Group (TRG) / Support
- Monday - Friday, 6 am - midnight EST, live support; inquiries submitted online during off hours
- Access to law enforcement, technical, and tool subject matter experts

Contact / Sign-Up
- For access to the secure portion of the NDCAC’s website, law enforcement should contact the NDCAC’s TRG via email: AskNDCAC@fbi.gov or by phone 855-306-3222

NDCAC - Law Enforcement’s Centralized Source of Knowledge