

*IMPLEMENTING THE NECP WEBINARS*

# 5G IS HERE: HOW WILL THIS IMPACT EMERGENCY COMMUNICATIONS?

June 29, 2022



# Agenda

- **Webinar Overview and Objectives**
- **National Emergency Communications Plan (NECP) and SAFECOM Nationwide Survey (SNS): Emerging Technology**
- **5G Capabilities and CISA 5G Strategy**
- **Resources and Actions**
- **Question and Answer Session**



# Presenters

## **Charlee Hess**

Cybersecurity and Infrastructure Security Agency (CISA)  
Emergency Communications Division

## **Steven Slater**

CISA National Risk Management Center



# National Emergency Communications Plan



## NECP Vision

To enable the nation's emergency response community to communicate and share information securely across communications technologies in real time, including all levels of government, jurisdictions, disciplines, organizations, and citizens impacted by any threats or hazards events



## Mandate

The NECP is mandated by Title XVIII of the Homeland Security Act of 2002



## Nation's Strategic Plan

The NECP is the nation's strategic plan to strengthen and enhance emergency communications capabilities



## Mission

To ensure the emergency response community drives toward a commonly defined end-state for communications



# NECP Goals



Goal 1  
Governance & Leadership



Goal 2  
Planning & Procedures



Goal 3  
Training, Exercise, & Evaluation



Goal 4  
Communications Coordination



Goal 5  
Technology & Infrastructure

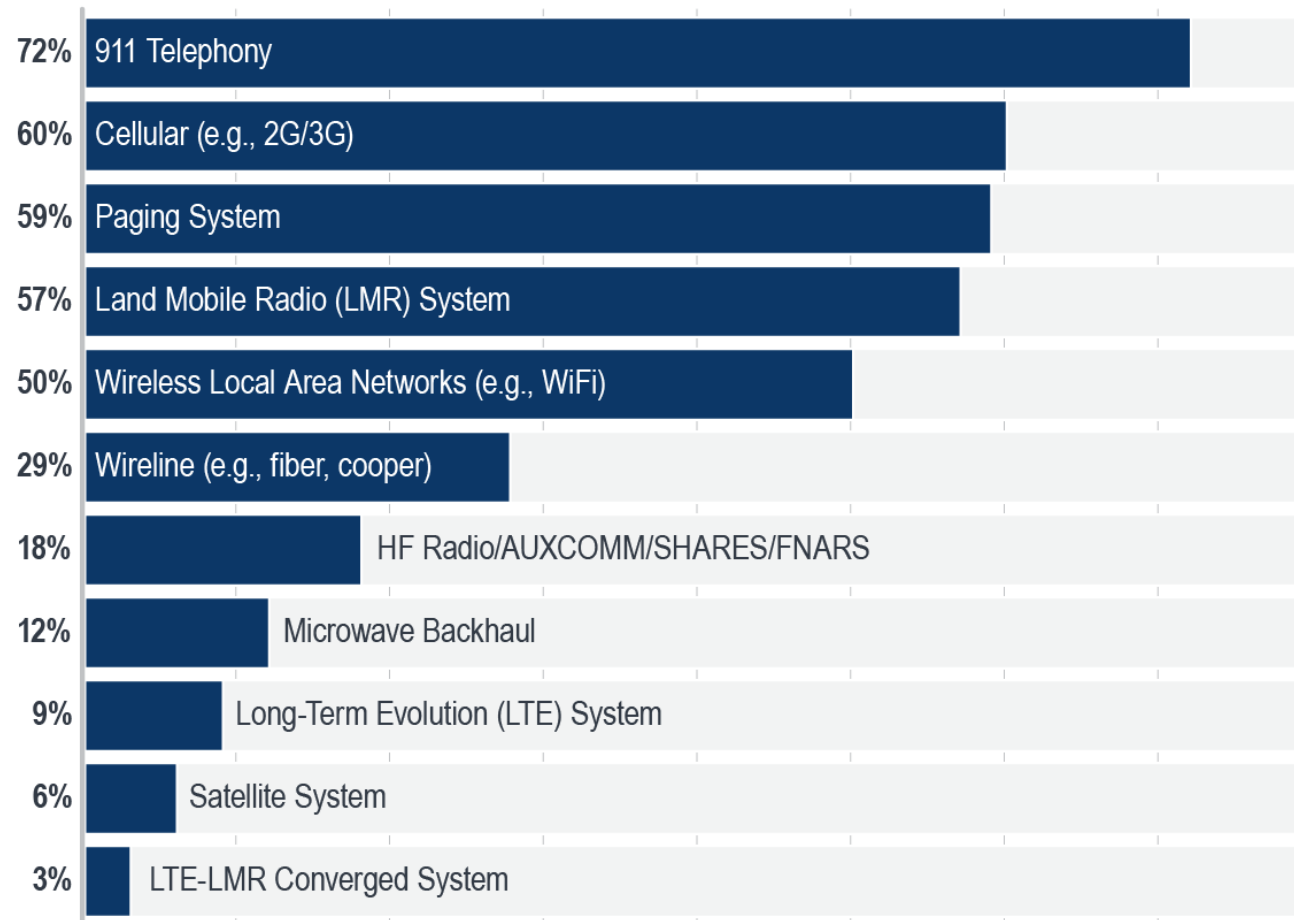


Goal 6  
Cybersecurity



# Technology Evolution Overview

## Systems in Use



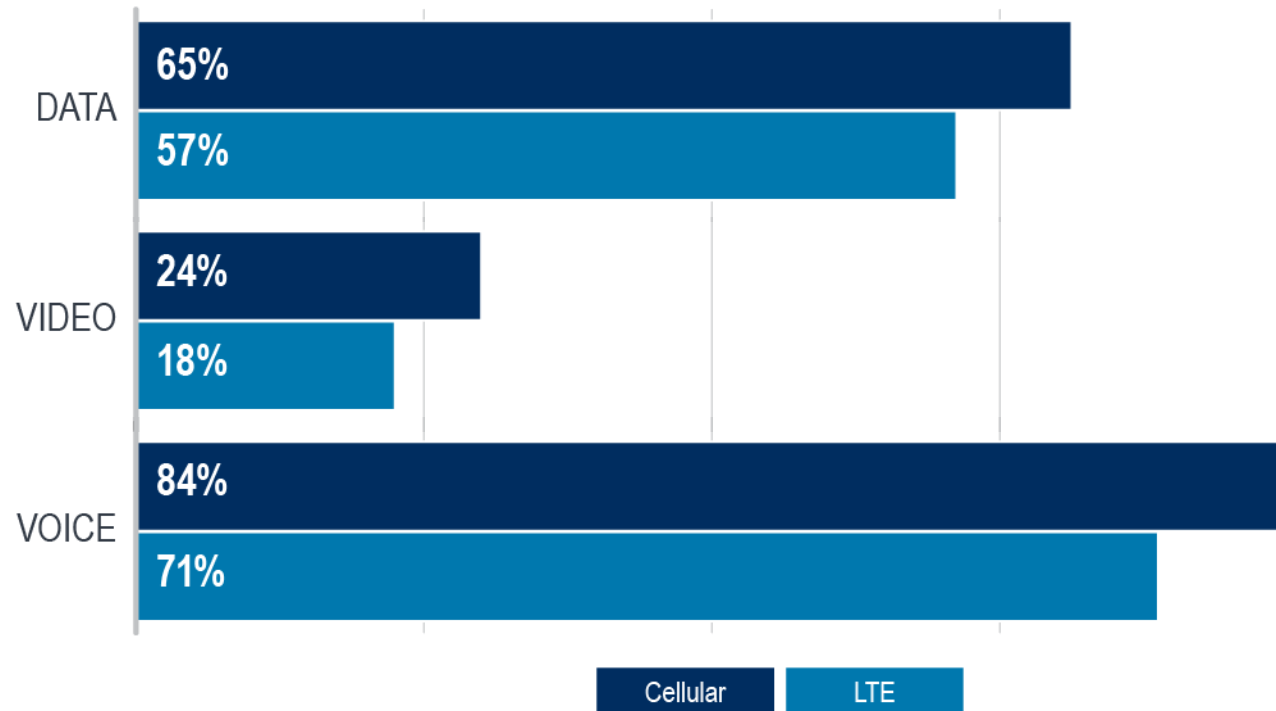
# SAFECOM Nationwide Survey (SNS)

The SNS consisted of 38 questions that span the 5 elements of the *SAFECOM Interoperability Continuum*, plus a security element that accounted for cybersecurity.



# SNS: Technology

## System Usage – Type of Use



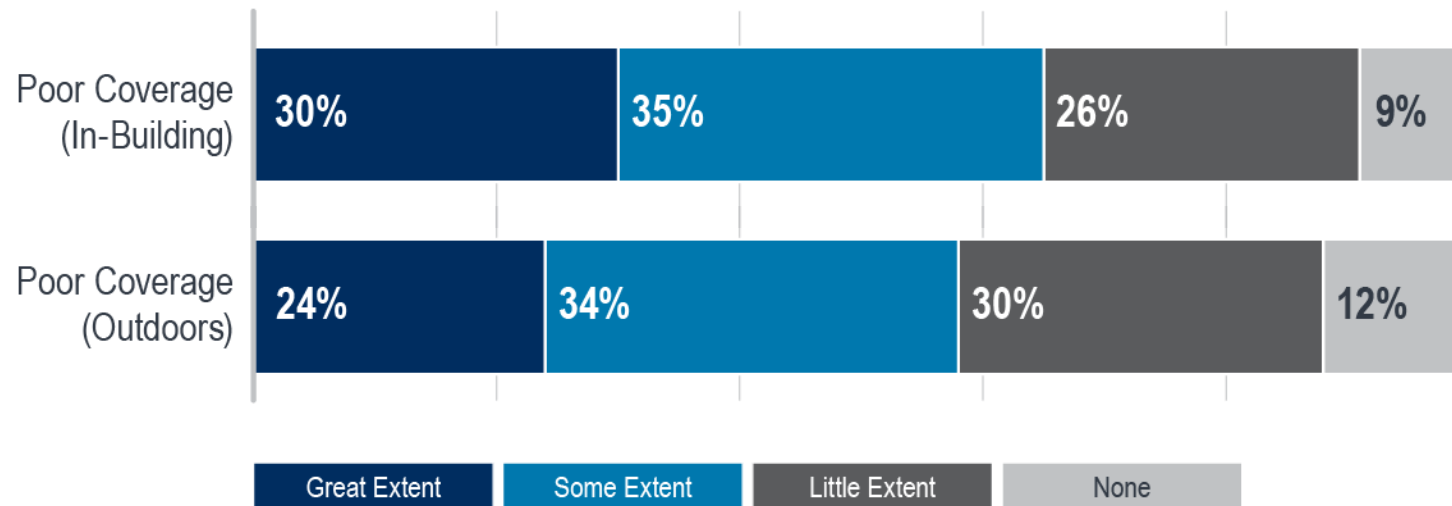
When looking at public safety organizations that use Long-Term Evolution (LTE) networks, the SNS data shows that LTE is **used more for voice services** and less for data services





# SNS: Technology

## Factors that Affect Ability to Communicate



Most respondents report **poor in-building (91%)** coverage and **poor outdoor (88%)** coverage impacting their ability to communicate



# NECP Success Indicators: Technology

## Goal 1

### Governance & Leadership



- Governance bodies include information management, network infrastructure, and cybersecurity representatives
- Governance bodies identify and address legislative and regulatory issues associated with emerging technology

## Goal 3

### Training, Exercise, & Evaluation



- Implement tools and trainings to address emerging technology impacts
- Include training and exercise programs to test communications systems and personnel, including emerging technology



# NECP Success Indicators: Technology

## Goal 4 Communications Coordination



- Develop and regularly update National Incident Management System-aligned standard operating procedures to facilitate the integration, deployment, and use of communications assets

## Goal 5 Technology & Infrastructure



- Foster an open, innovative, and standards-based commercial marketplace for solutions development to ensure requirements are addressed in emerging standards
- Cultivate sustained engagement between federal research, development, testing, and evaluation programs and public safety organizations to address resiliency, interoperability, and other challenges



# The Promise and Reality of 5G



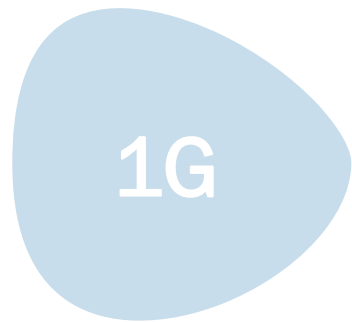
FOR DISCUSSION PURPOSES ONLY

Steven Slater  
June 29, 2022

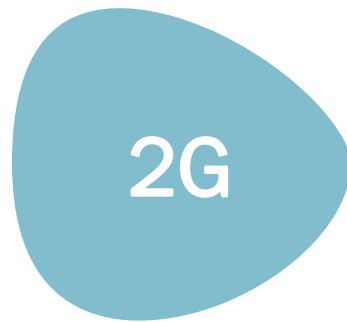
13

# What is 5G?

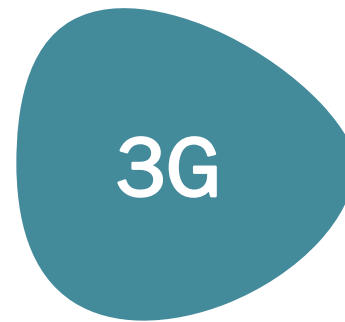
5G is the next generation of wireless networks. Building upon exiting 4G Long-Term Evolution (LTE), 5G brings new capabilities that will transform the digital landscape and serve as a catalyst for innovation, new markets, and economic growth around the world.



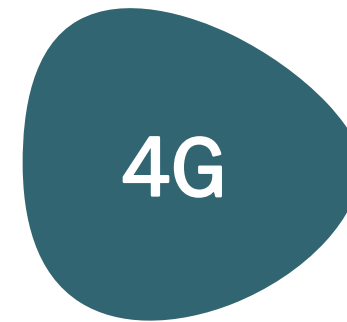
**FIRST GENERATION**  
1G delivered analog voice



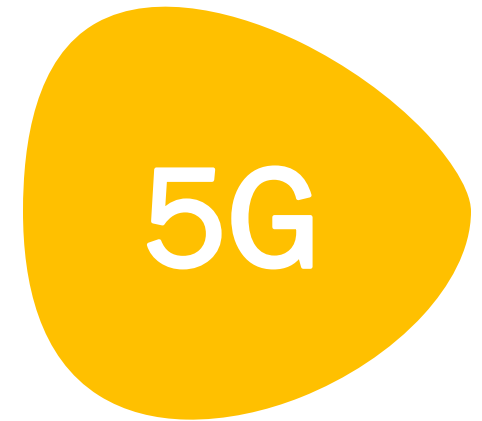
**SECOND GENERATION**  
2G introduced digital voice (e.g., Code Division Multiple Access [CDMA])



**THIRD GENERATION**  
3G brought mobile data (e.g., CDMA 2000)



**FOURTH GENERATION**  
4G LTE ushered in the era of mobile broadband



**FIFTH GENERATION**  
5G delivers the age of smart devices, connecting virtually everyone and everything through machines, objects, and devices



# The Promise of 5G

5G networks and future communications technologies will introduce a vast array of new connections, capabilities, and services. Compared to 4G, 5G will bring:



## 100x Network Capacity

5G promises greater traffic capacity, allowing for millions of devices to be connected on the same network within a small area.



## 10x Decrease in Latency

Data response times will be as low as 1 millisecond, providing endless possibilities from remote surgeries to self driving cars.



## 100x Faster Download Speeds

While a 3GB movie would take 40 minutes to download on 4G, it will take only 35 seconds on a 5G network.



## 3x Spectrum Efficiency

5G will operate on three different spectrum bands, low, mid, and high-band, to enhance capabilities and coverage.



# How is 5G Different?

5G improves upon previous generations of telecommunications technology in its use cases, spectrum usage, and infrastructure deployments:

## Diverse Use Cases



**Enhanced Mobile Broadband (eMBB)**



**Ultra Reliable Low Latency Communication (URLLC)**  
(i.e., Mission-Critical Services)



**Massive Machine-Type Communication (mMTC)**  
(i.e., Massive Internet of Things [IoT])



## Diverse Spectrum

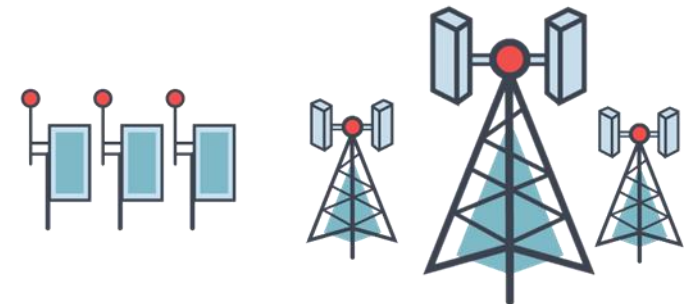


**mmWave  
High-band**  
Above 24 GHz

**Sub-6 GHz  
Mid-band**  
1 GHz - 6 GHz

**Sub-GHz  
Low-band**  
Below 1 GHz

## Diverse Deployments



# Spectrum

Unlike 4G-LTE, 5G will operate on three different spectrum bands; low, mid, and high-band. When it comes to performance and coverage, each band consists of different characteristics.



## Low-band <1 GHz

### “Exceptional Coverage”

Low-band spectrum networks are designed for nationwide coverage and is the ideal choice for targeting rural America.

- Wide coverage area (hundreds of sq. miles)
- This spectrum is the base for FirstNet
- Recommended as the ideal choice for reaching 95% of farmland by 2025

## Mid-band 1 - 6 GHz

### “Outstanding Capacity”

Recognized as the dominating spectrum category internationally, mid-band networks are well suited for delivering metropolitan network coverage.

- Moderate coverage area (several sq. miles)
- Average speeds around 100 megabits/sec
- The capacity boost allows for a significant increase in connected devices

## High-band 24 - 47 GHz

### “Revolutionary Creativity”

Often referred to as millimeter waves, high-band spectrum unlocks 5G’s greatest potential and is designed for high density urban areas.

- Limited coverage area (Less than a mile)
- Gigabit speeds (40 – 80x faster than 4G)
- High-band, millimeter waves do not travel well through walls or windows





# New Devices

In order to access the 5G network and its various capabilities, users will need to acquire new devices that can receive 5G connectivity. Some of these devices include:

## IoT Devices

- Automotive
- Agriculture
- Industrial
- Security
- Health care
- Infrastructure



## Network Hardware

- Enterprise-Class Cellular Gateways
- Home/Office Routers with embedded modems
- Mobile routers with embedded/modular modems



## End-User Devices

- 5G enabled phones
- 5G Hotspots
- Wearables
- Appliances



# Use Cases

As identified by 3GPP, the leading global telecommunications standards development body, initial 5G applications will be organized by use case type, which are defined by their unique characteristics and services they facilitate:

## eMBB

Enhanced Mobile Broadband



Virtual/Augmented Reality



Work/Play in the Cloud



Mobile Ultra High-Definition



Smart Home

## URLLC

Ultra-Reliable Low Latency Communication



Autonomous Vehicles



Remote Medical Procedures



Industrial Automation



Public Safety

## mMTC

Massive Machine Type Communication



Transport and Logistics



Intelligent Agriculture



Smart Cities



Remote Healthcare

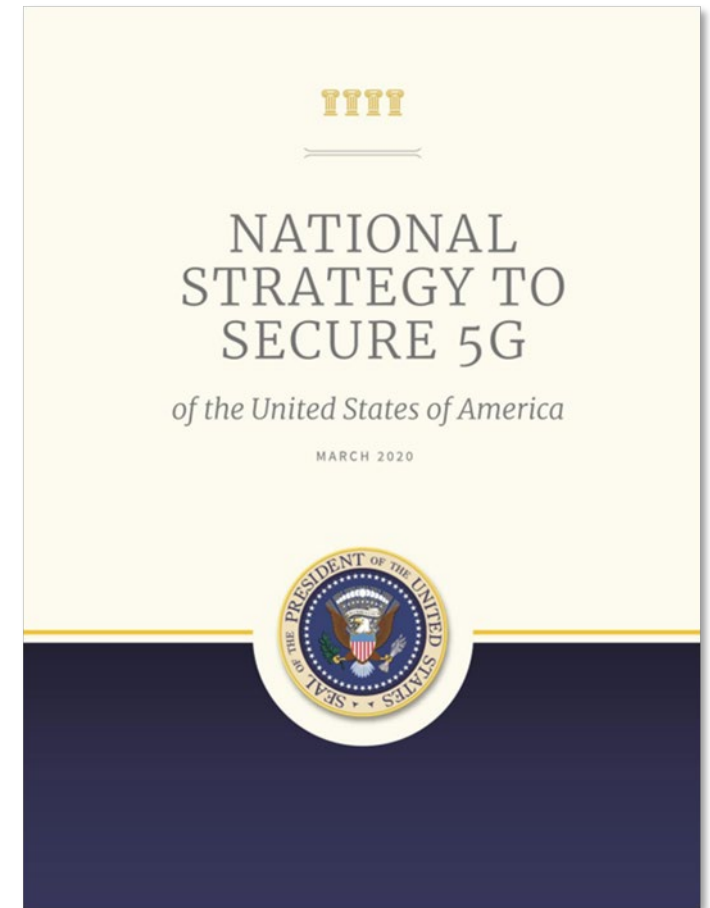


# The National Strategy to Secure 5G

Building upon the Prague Proposals, the *National Strategy to Secure 5G* was issued to outline how the U.S. Government will secure 5G infrastructure domestically and internationally by establishing four Lines of Effort:

## Lines of Effort:

- 1 Facilitate Domestic 5G Rollout
- 2 Assess Risks to and Identify core Security Principles of 5G Infrastructure
- 3 Address Risks to United States Economic and National Security During Development and Deployment of 5G Infrastructure Worldwide
- 4 Promote Responsible Global Development and Deployment of 5G



# CISA's Role in Securing 5G

The Cybersecurity and Infrastructure Security Agency (CISA), through the National Risk Management Center (NRMC), is leading risk mitigation efforts by working with government and industry partners to ensure the security and resiliency of 5G technology and infrastructure.

## VISION

5G connectivity that enhances national security, technological innovation, and economic opportunity

## MISSION

Lead 5G risk management efforts to promote the development and deployment of secure and resilient 5G infrastructure

## CORE COMPETENCIES:



### RISK MANAGEMENT

Promote secure and resilient 5G deployment by leading efforts to identify, analyze, prioritize, and manage risks, in order to enhance the protection and resilience of the National Critical Functions



### STAKEHOLDER ENGAGEMENT

Actively engage federal, state, local, tribal and territorial (FSLTT), industry, association, academia, non-profit, and international partners to address 5G challenges



### TECHNICAL ASSISTANCE

Update and develop instructional tools and services to support stakeholders with the planning, governance, operational, and technical aspects of secure 5G deployment

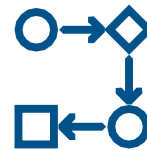


# 5G Cybersecurity Risks

The Department of Homeland Security (DHS) Cybersecurity and Infrastructure Security Agency (CISA) assesses that the Fifth Generation Mobile Network (5G) will present opportunities and challenges, and its implementation will introduce potential vulnerabilities inhibiting its secure deployment. The following are examples of those risks:



Attempts by threat actors to influence the design and architecture of 5G networks



Susceptibility of the 5G supply chain due to the malicious or inadvertent introduction of vulnerabilities



Current 5G deployments leveraging legacy infrastructure and untrusted components with known vulnerabilities



Limited competition in the 5G marketplace resulting in more proprietary solutions from untrusted vendors

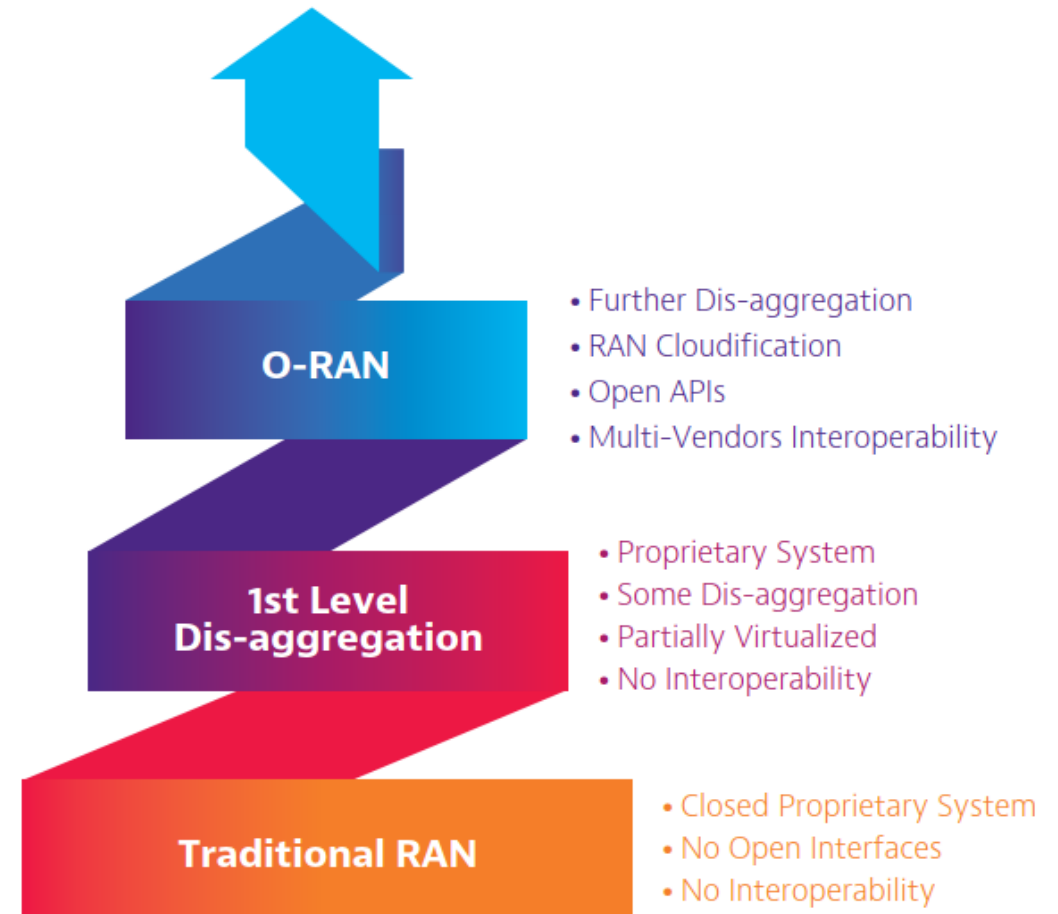


5G technology potentially increasing the attack surface for malicious actors by introducing new vulnerabilities



# Open RAN Architecture

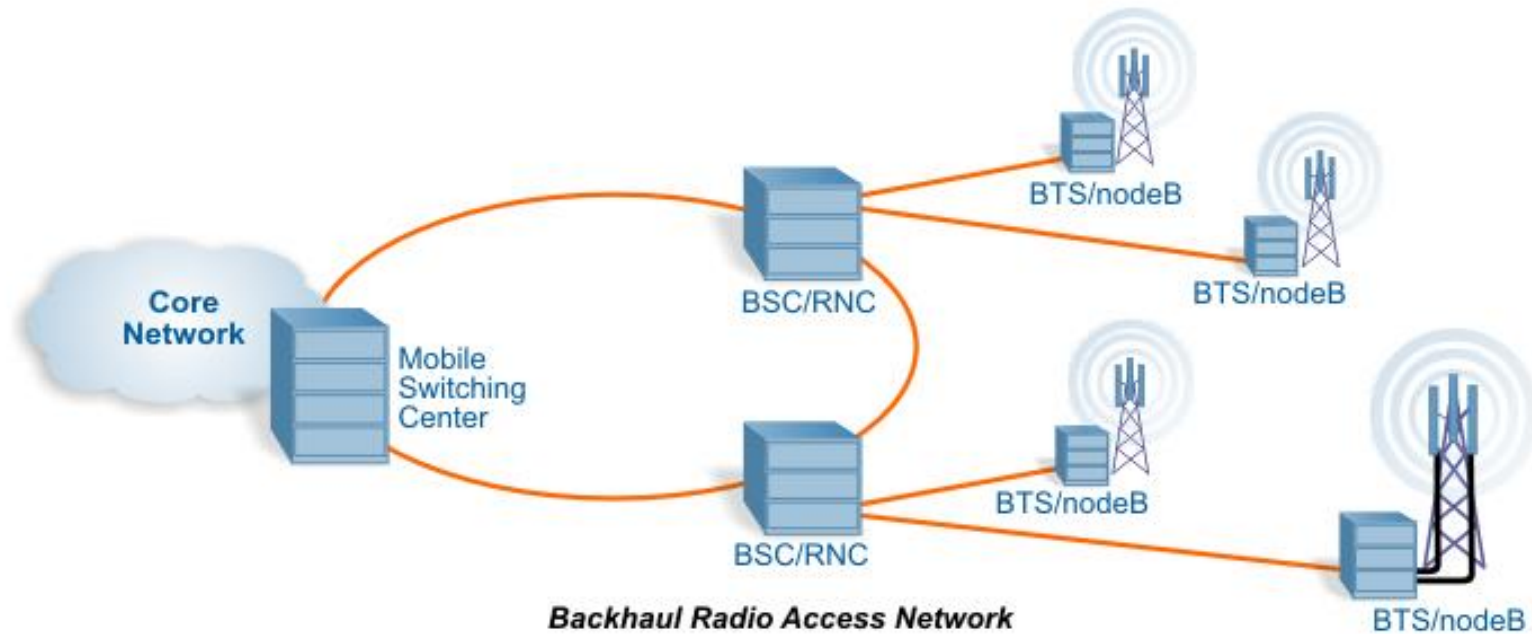
- »» Open Radio Access Networks (Open RAN) offers a solution to supply chain concerns, as well as enhancing interoperability amongst suppliers.
- »» It is expected that 5G and Open RAN architecture will be the primary network upon which emerging technologies, such as Artificial Intelligence, will rely on every day.
- »» This would lead to a blurring of tradition network separation, as networks become more interoperable and rely on one another.



# What is Radio Access Network?

Wireless networks are comprised of two domains: the Radio Access Network (RAN) and the Core Network (Core).

The radio access network (RAN) is the final link between the network and the phone, while the Core services many other functions, such as routing phone calls, authenticating services, and connecting users to the internet. The RAN serves as the interface between the user's equipment and the service provider's core network.



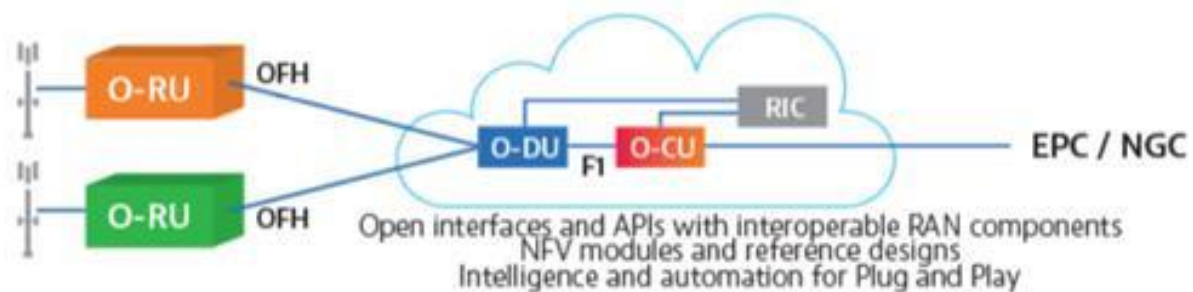
# What is Open RAN?

Open radio access networks (O-RAN) refers to a concept where cellular networks consist of hardware and software components from multiple vendors while remaining open and interoperable.

## Traditional RAN



## Open RAN





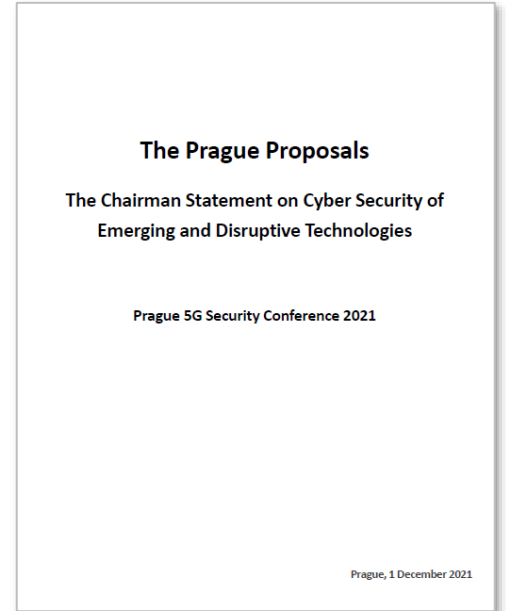
# 5G & Emerging Technologies

Emerging Technologies are technologies being developed that are expected to significantly impact all sectors, particularly those critical to national security, such as healthcare, transportation, and energy, as well as governments and their citizens.

The 2021 Prague 5G Security Conference brought together international agencies and representatives to highlight current advancements of safe and secure 5G deployment, while recognizing the challenges that still lie ahead, and placed an emphasis on understanding the new risks posed by future emerging and disruptive technologies (EDTs).

## Key Takeaways:

- »» As 5G infrastructure and EDTs develop, it is vital that open collaboration continue to be the foundation for secure, resilient, and open architectures, to include standards development.
  - A whole-of-government approach is required, and governments should collaborate not only with like-minded governments, but should also look to engage private sector, non-governmental organizations, and academia stakeholders.



# What is Artificial Intelligence?

- » Artificial intelligence (AI) refers to systems or machines that mimic human intelligence to perform tasks and can iteratively improve themselves based on the information they collect.
- » The increased use of AI is inevitable as part of the ongoing global race to leverage new technologies for competitive advantages by nations and to increase economic prosperity by private sector entities.
- » Use of AI can transform global economies, effect U.S. national security, and impact American citizens in their daily lives.
- » The potential impact of AI also extends to critical infrastructure sectors like manufacturing, financial services, transportation, healthcare, energy, and food and agriculture.



# AI-enabled Emergency Communications

In the event of an emergency, every second is vital. The need for a fast and efficient response is important, and while 5G has already brought great advances to wireless emergency communication networks, the role of artificial intelligence in optimizing these responses can change the future of emergency communications.



## Next Generation 9-1-1

The Next Generation 9-1-1 (NG9-1-11) initiative is aimed at updating current 9-1-1 service infrastructure, and enable the public to transmit text, photo, and video data to emergency personnel. AI-enabled emergency communications can support cloud computing, edge computing, embedded security, and data analytics.



## Augmenting Decision Making

AI can be programmed to analyze incoming information and communications from a variety of sensors and devices, and then use that information to identify potential issues and hazards, and analyze the proper resources needed to respond to the emergency.



## Wearable Technology

5G connectivity will enable a network of devices, such as body-worn cameras and biometric sensors, that remotely monitor first responder vital signs and stress levels. These devices can enhance safety and effectiveness by automatically signaling distress when vital signs are below threshold or sensing threats in the immediate vicinity.



## Public Safety Answering Point Staffing Shortages

There is a current shortage in Public Safety Answering Points (PSAP). AI-enabled emergency communications would improve wait times and accessibility for callers. Having this capability would alleviate resource challenges in major emergency events.



# Federal Government Efforts in AI



## National Artificial Intelligence Initiative

The National Artificial Intelligence Initiative Act of 2020 (NAIIA) established the National Artificial Intelligence Initiative (NAII). The National AI Initiative provides an overarching framework to strengthen and coordinate AI research, development, demonstration, and education activities across all U.S. Departments and Agencies, in cooperation with academia, industry, non-profits, and civil society organizations.



## Department of Homeland Security Artificial Intelligence Strategy

In December of 2020, the Department of Homeland Security (DHS) released their AI strategy. The strategy sets out to establish goals that will govern DHS's approach to successfully integrating AI into the mission in a responsible and trustworthy manner and successfully mitigating risks associated with AI across the homeland security enterprise.



# 5G, AI, and Emergency Communications

- »» As 5G continues to mature and usher in massive amounts of data on 5G-enabled devices, there is possibilities for artificial intelligence to be leveraged to analyze this data quickly and generate useful outputs.
- »» Emergency situations require quick and informed decisions, as well as uninterrupted communications. 5G and AI working together will bring new tools and information to first responders to allow them to navigate and respond to these emergency situations effectively.





For more information:  
[www.cisa.gov/5G](http://www.cisa.gov/5G)

Questions?  
Email: [5G@cisa.dhs.gov](mailto:5G@cisa.dhs.gov)

# Resources

- [National Emergency Communications Plan](#)
- [SAFECOM Nationwide Survey](#)
- CISA 5G Security and Resilience: [cisa.gov/5g](https://cisa.gov/5g)
  - CISA 5G Strategy
  - Overview of Risks Introduced by 5G Adoption in the United States
  - 5G Market Penetration and Risk Factors Infographic
  - 5G Basics Infographic
- [National Strategy to Secure 5G of the United States of America](#)



# How You Can Take Action

- **Take steps** for your organization or jurisdiction to implement the NECP and achieve its success indicators
- **Use system lifecycle best practices** when adopting 5G capabilities and other emerging technologies
- **Identify and resolve** implementation, regulatory, compliance, and/or legal issues for 5G and other emerging technologies
- **Update** governance, SOPs, use, training, and exercises programs to include 5G and other emerging technologies



Charlee Hess  
June 29, 2022



Questions?



# Upcoming Webinars

Join the Cybersecurity and Infrastructure Security Agency for webinars focused on:

## Implementing the National Emergency Communications Plan

Bookmark our webpage to check back for future webinars:  
**[cisa.gov/necp-webinars](https://cisa.gov/necp-webinars)**

**All webinars start at 1PM ET**

**To join, use:**

**Webinar link (for visual):** <https://share.dhs.gov/necpwebinars>

**Dial-in (for audio):** 800-897-5813





For more information on the NECP:  
[cisa.gov/necp](https://cisa.gov/necp)  
[NECP@cisa.dhs.gov](mailto:NECP@cisa.dhs.gov)

