MEETING NOTES
Iowa Advisory Council on Automated Transportation (ATC)
Infrastructure Readiness (IR) Subcommittee Meeting
Tuesday, May 25, 2021
1:00-2:00 pm CT

1. Welcome and introductions – Erin Mullenix, Infrastructure Readiness Subcommittee Chair
    a. Attendees – 20 attendees
        • Erin Mullenix (Infrastructure Readiness Subcommittee Chair) – Iowa League of Cities
        • Cody Postier – FirstNet (AT&T)
        • Dave Ness – City of Dubuque
        • Robert Denson – Des Moines Area Community College
        • Nathan Fulk – Iowa State Patrol
        • John Gibson – Iowa Division of the Federal Highway Administration (FHWA)
        • Mark Nahra – Woodbury County
        • Peter Rafferty – Gannett Fleming
        • Neal Hawkins – Iowa State University, Center for Transportation Research and Education
        • Dan McGehee, Omar Ahmad, Jacob Heiden – University of Iowa, National Advanced Driving Simulator
        • Scott Marler, Donna Matulac, Garrett Pedersen, Peggi Knight, Dave Lorenzen, Susan Fenton, Clayton Burke, Adam Shell – Iowa DOT

2. FirstNet: Understanding 5G Spectrum and the Future of Autonomous Vehicles - Cody Postier, FirstNet (AT&T) Regional Manager – Public Safety Solutions
    a. Cody Postier is part of the FirstNet team tasked with bringing 5G to the first responder community. 5G will transform our technology world. It will create a massive Internet of Things (IoT) connectivity. The network will have ultra-low latency, ultra-reliability, ultra-high speeds with better throughput. The 5G network allows telecommunications companies to develop a core network based on software defined networking, which allows more creativity, more flexibility, and faster responses for innovative solutions needed for smart cities and automated transportation.
    b. ATT&T delivers customers two types of 5G: 5G and 5G+. <u>All</u> FirstNet subscribers simultaneously maintain connectivity to the dedicated Band-14[1] public safety network.
        • AT&T uses 5G for its nationwide network. The sub-6 GHz frequencies include the spectrum traditionally used by wireless operators for long term evolution (LTE) and voice calls. They can travel longer distances (approximately 2 miles) and penetrate buildings. This frequency is useful in residential, suburban, rural, and on-the-go areas. It doesn't provide the data capacity of the mmWave spectrum.
        • The 5G+ frequency uses millimeter band (mmWave) antennas to provide coverage in parts of select cities as well as in various public and private venues. This spectrum is well-suited for 5G because a lot of data capacity can be packed into all those small millimeter waves allowing more data capacity at faster speeds. 5G+ is best suited for dense, high-trafficked areas including stadiums & arenas, urban areas, shopping centers, and universities & colleges.
    c. There are two different 5G network deployment strategies: Non-Standalone Access (NSA) and Standalone Access (SA).
        • NSA relies on the 4G network facilities to provide more speed and higher data bandwidth. It uses 4G Core for Control Plane and 5G for User Data. A 5G-enabled smartphone will connect to 5G or 4G

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[1] What Is FirstNet Band 12? December 6, 2019 - https://www.digi.com/blog/post/what-is-firstnet-band-14

network depending on conditions. Benefits of the NSA are it's easier for operators to deploy 5G networks, it can support Dual Mode devices (4G LTE and 5G), and it provides greater bandwidth than 4G LTE.

- SA is pure 5G network where the 5G network has its dedicated 5G infrastructure and is independent of the 4G network. The SA strategy realizes all benefits of 5G technology and delivers super-fast and flexible network with ultra-low latency.

d. FirstNet 5G+ network launched in April 2021 and will utilize the dedicated 5.9 GHz safety spectrum. An enhanced and dedicated FirstNet Core network is being deployed adding 5G to the existing 4G LTE access. This upgraded core supports increased capacity with much higher speeds. The FirstNet 5G Core enables quick deployments of additional User Planes, allowing packet process and traffic aggregation to be performed closer to the network edge.

e. 5G is talked about in terms of frequencies and bands. The frequency spectrum is referred to as sub-6, meaning below 6 GHz. These frequencies are used for AM/FM radio, satellite radio, and 5GHz Wi-Fi. In terms of bands, there is a low band, a mid-band, and a high band. FirstNet will provide access to AT&T 5G mmWave and 5G Band-2 and Band-66. With 5G and 5G+, users will user various parts of the spectrum: low bands will provide coverage, mid-bands will provide data capacity and speed. mmWave provides fiber-like speeds. 5G in a rural setting will provide faster speeds because there will be less data needs. Rural areas won't see full 5G coverage for awhile because it is less dense.

f. Full self-driving transportation is difficult to achieve. We aren't there yet despite companies spending large amounts of money to find solutions. Automation has the potential to reduce crashes & stress and increase mobility, but it's impossible to say exactly how because technology is evolving rapidly. Reaching self-driving cars requires connectivity. AT&T expects 5G to come to the auto industry in 2024 allowing a connected car experience.

g. A connected car experience allows and involves in-car video & gaming, advanced driver assistance, real-time diagnostics, vehicle to anything (V2X communication), HD mapping, and factory automation. While full self-driving might not arrive for a while, we do see current examples of automation testing pilots throughout the country. These are small scale and operate under certain conditions with public oversight.

h. Communications technologies will be key enablers in the connect car evolution. Network-based communication will communicate with infrastructure designated for mobile networks. Direct based networks will operate independent of cellular networks. Telecom companies are using standard to develop these networks. The reallocation of the 5.9 GHz Safety Spectrum doesn't limit AT&T's ability to provide connectivity, but it depends on how it will be allocated. There are opportunities to operate together cohesively.

3. IR Subcommittee Work Plan & Tactical Actions – (20 minutes)
   a. AT Readiness – Adam Shell, Iowa DOT
      - The Federal Highway Administration (FHWA) is developing National Roadway Integration of Automated Driving Systems Concept of Operations. It's expected to be completed late 2021. It supports the integration of ADS by 2035, in an anticipated mixed fleet environment. It is a living breathing document that will be updated as needed. Iowa is involved in developing chapter 6 providing input on digital infrastructure related to the operational concept for ADS integration.
      - FHWA release the following research report: Impacts of Automated Vehicles on Highway Infrastructure. The purpose is to provide information to stakeholders as they prepare for the deployment of AVs. The research is focused on two broad areas: advanced driver assistance systems (ADAS) and automated driving systems (ADS). The infrastructure categories involve physical infrastructure, traffic control devices and roadside units, transportation system management operations and intelligent transportation infrastructure, and urban multimodal infrastructure. Pavement markings currently appear to be the foremost infrastructure priority to support AVs.
   b. Improve Pavement Markings – Adam Shell and Clayton Burke, Iowa DOT

- The FHWA conducted a rulemaking process to update the Manual on Uniform Traffic Control Devices (MUTCD). The update incorporates new research and new technologies. It's human-centered, data-driven safety and operation protocol design for all road users of differing levels of abilities and limitations including pedestrians, bicyclists, and motorists. Based on research on human drivers and ADS, the amendments for the updated MUTCD propose normal-width lines as 6" for freeways, 6" where speed limits are greater than 40 mph, and 4"-6" for all other roadways. It proposes wide lines as 8" where 4"-5" normal lines are used and 10" wide where 6" normal lines are used.
- The MUTCD includes a new section related to autonomous vehicles, but it's not a requirement. The information provides agencies a set of criteria for AVS and agencies decide whether to fit roads for AVs. Recommended factors include line widths, sign orientation, refresh/flicker rate, and "ghost" lines in work zones. The MUTCD address traffic control devices only and not vehicle systems. There will be additional updates more frequently in the future as technologies evolves. FHWA will now review all the comments received from the rulemaking before finalizing changes.
- The Iowa DOT recently examined their interstate pavement marking program and found that improvements can be made to improve safety for current drivers today and future drivers tomorrow. Enhancements are needed to support automated vehicles, similar to the MUTCD recommendations. These enhancements would not only support AVs but would also have better longevity and increase safety for workers. Safety enhancements to the Iowa DOT interstate highway pavement marking program include surface prep edge lines and grooved white skips with black contrast. Iowa is targeting new interstate construction projects to incorporate these enhancements to achieve the most benefit. The budget will determine how much and how fast these enhancements are rolled out across the state, and Iowa DOT has developed a tool to determine what is feasible based on the budget while prioritizing what would work best for the state.

4. Open Discussion – All subcommittee members

5. Information and key upcoming dates
   a. Policy & Legislation Subcommittee Meeting - Wednesday, June 2nd, 1-2PM
   b. Public Safety & Enforcement Meeting - Wednesday, June 9th, 10-11AM
   c. AT Council Meeting - Late July or Early August 2021

ATC SUBCOMMITTEE MEETING

Infrastructure Readiness

May 25, 2021

MEETING AGENDA

1. Welcome and introductions – Erin Mullenix, Infrastructure Readiness Subcommittee Chair

2. FirstNet: Understanding 5G Spectrum and the Future of Autonomous Vehicles - (30 minutes)
   a. Cody Postier, FirstNet (AT&T) Regional Manager – Public Safety Solutions

3. IR Subcommittee Work Plan & Tactical Actions – (20 minutes)
   a. AT Readiness – Adam Shell (Iowa DOT)
      i. National Roadway Integration of Automated Driving Systems Concept of Operations
      ii. FHWA Research Report - Impacts of Automated Vehicles on Highway Infrastructure
   b. Improve Pavement Markings - Adam Shell & Clayton Burke (Iowa DOT)
      i. Manual on Uniform Traffic Control Devices (MUTCD) Update
      ii. Pavement Marking Dashboard Update

4. Open Discussion – All subcommittee members (10 minutes)

5. Information and key upcoming dates
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WELCOME AND INTRODUCTIONS

Erin Mullenix –

Infrastructure Readiness
Subcommittee Chair

FIRSTNET: UNDERSTANDING 5G SPECTRUM AND THE FUTURE OF AUTONOMOUS VEHICLES

Cody Postier, FirstNet (AT&T) Regional Manager – Public Safety Solutions

The 5G Transformation

Massive IoT Connectivity

Smart City Enablement
Supporting billions of connected devices and sensors

4G ——1000X—— **5G**

1K/km² 1M/km²

Ultra Low Latency
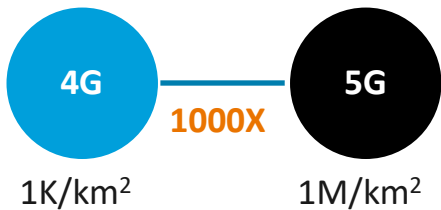
Edge Technologies further accelerate responsiveness

Ultra Reliability

Advanced Network Core Connectivity

Better Throughput

Support massive data workloads

Ultra High-Speeds

Speeds up to 10 Gbps

4G ——100X—— **5G**

100 Mbps 10 Gbps
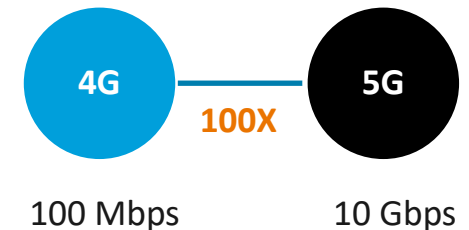
WHAT IS 5G SUB-6

What's the difference between 5G and 5G+?

AT&T delivers our customers two flavors of 5G, however ALL FirstNet Subscribers simultaneously maintain connectivity to the dedicated Band-14 public safety network.

5G (Sub-6) - what AT&T is using for its 5G **nationwide** network. The Sub-6 GHz frequencies include the spectrum traditionally used by wireless operators for LTE and voice calls and they generally can travel longer distances and penetrate into buildings, but it doesn't provide the data capacity of millimeter wave (mmWave) spectrum.

What's the difference between 5G and 5G+?

AT&T delivers our customers two flavors of 5G, however ALL FirstNet Subscribers simultaneously maintain connectivity to the dedicated Band-14 public safety network.

5G+ (mmWave small cell) - AT&T's 5G+ network uses mmWave antennas to provide coverage in **parts of select cities** as well as in various public and private **venues** across the country.

Millimeter wave spectrum is well suited for 5G because a lot of data capacity can be packed into all those small millimeter waves. This makes its use for 5G so promising since more data capacity translates to faster data speeds.

5G+ mmWave is available in limited locations in select cities.
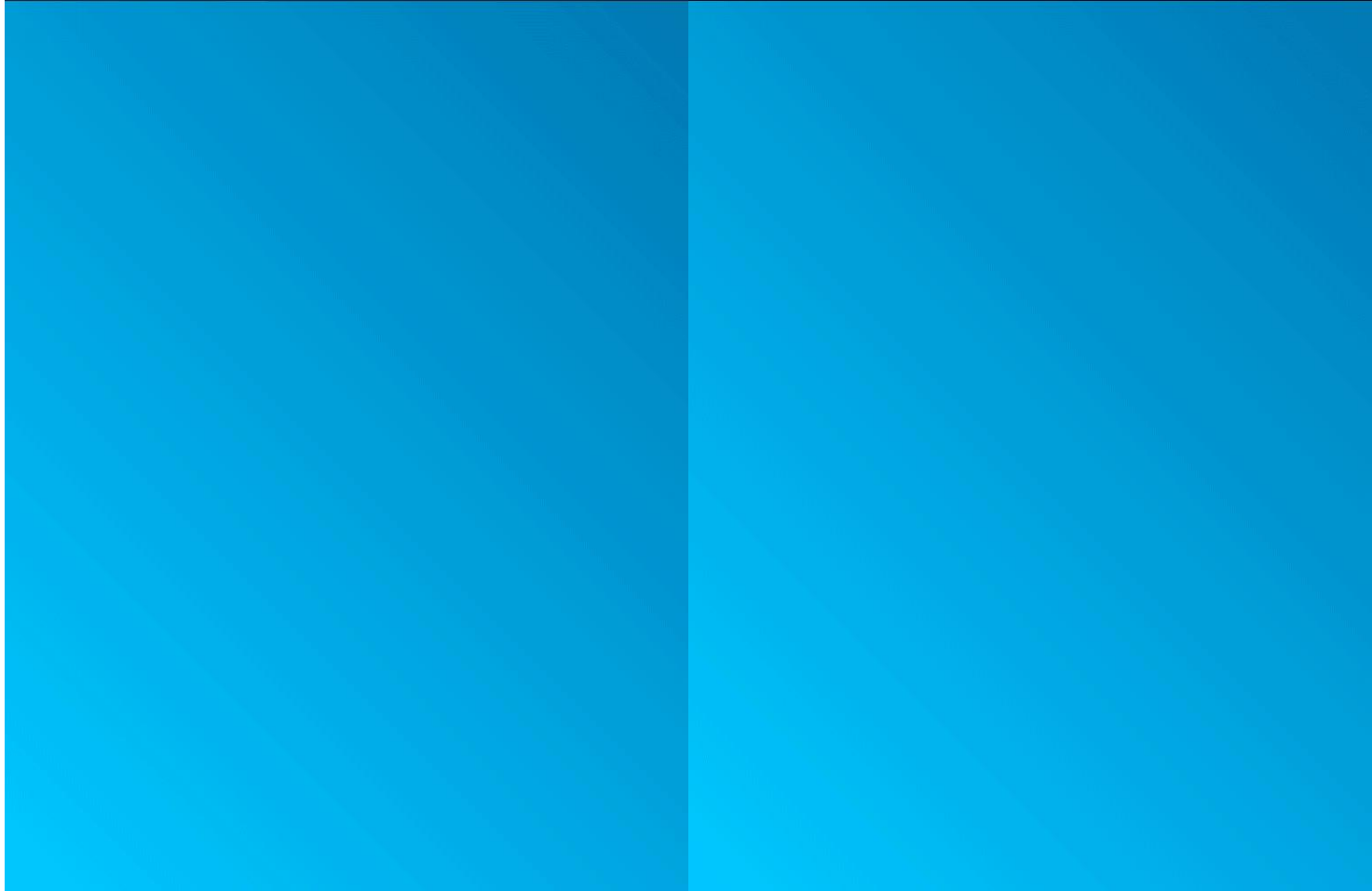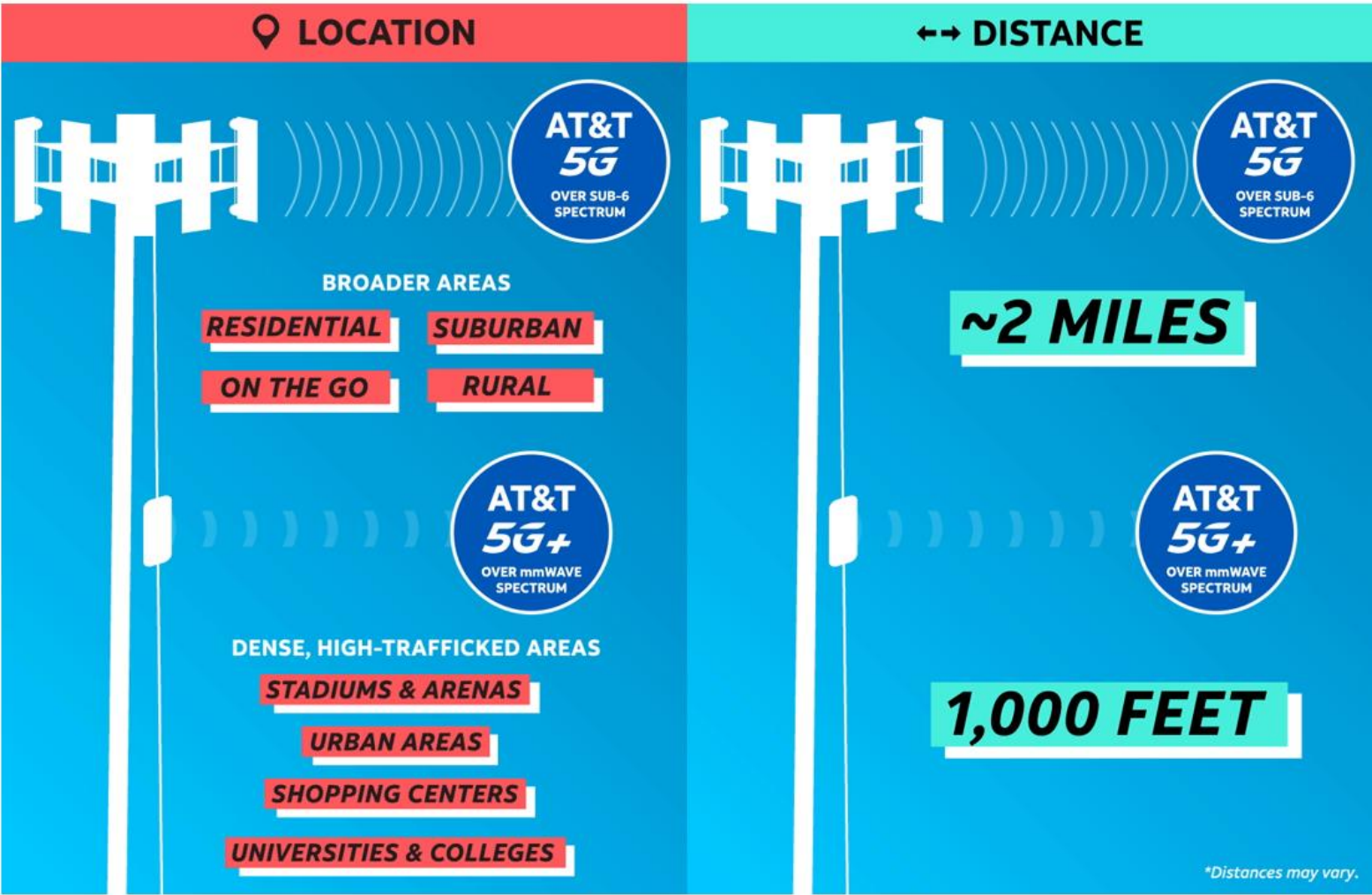
Two different 5G Network Deployment Strategies

NSA (Non-Standalone Access) and **SA (Standalone Access)** are the two 5G network modes.

NSA relies on the 4G network facilities to provide more speed and higher data bandwidth. Uses the 4G Core for Control Plane and 5G for User data. A 5G-enabled smartphone will connect to 5G or 4G network depending on conditions.

NSA Benefits

- Easier for Operators to deploy 5G networks
- Can support Dual Mode devices; both 4G LTE and 5G
- Provides greater bandwidth than 4G LTE

SA is the pure 5G network, where the 5G network has its dedicated 5G infrastructure and is independent of the 4G network.

SA Benefits
- Realize all the benefits of 5G technology
- Deliver super-fast and flexible network, ultra-low latency.

Non-Standalone Access   **Standalone Access**

AT&T Business
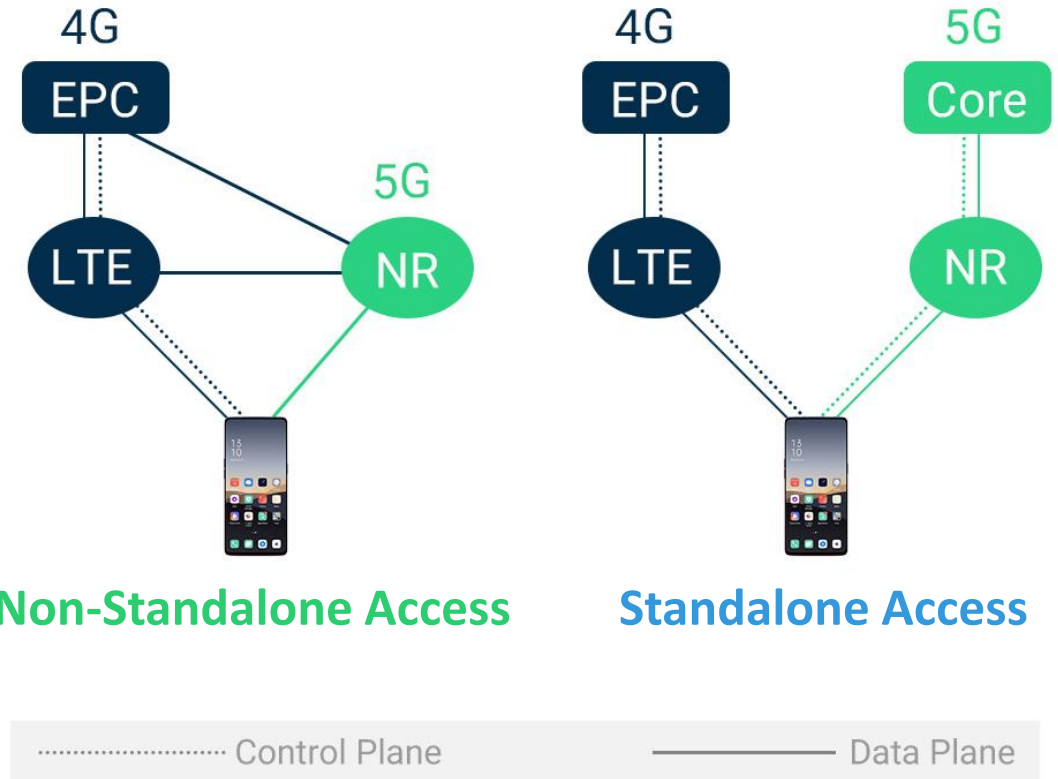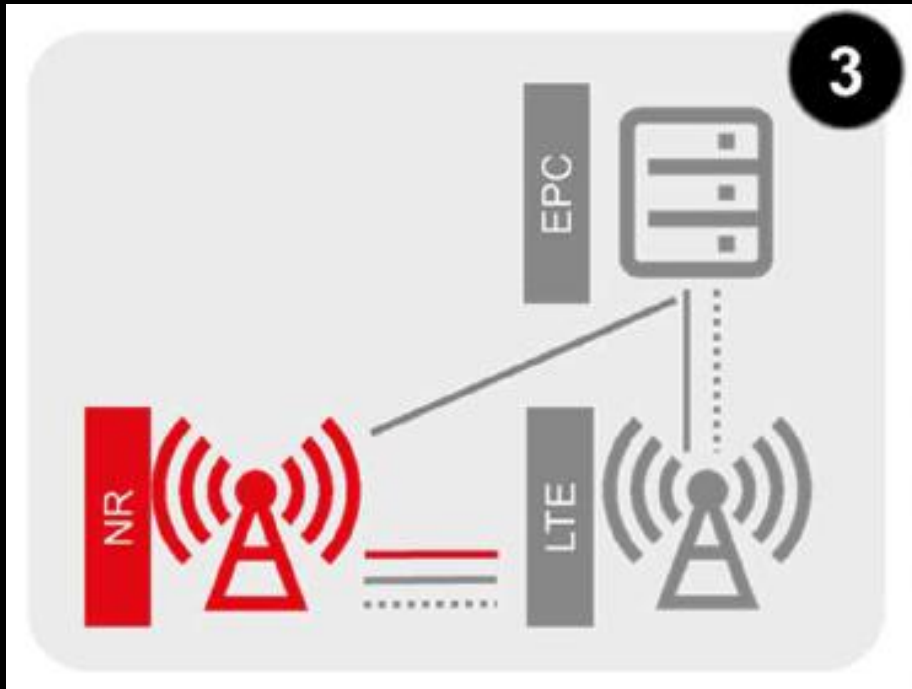
FirstNet 5G shows AT&T's commitment to providing reliable, stable, and fast connectivity to first responders.

FirstNet 5G+ Launch

FirstNet 5G+ launches in April 2021. Coming soon – Building upon the 5G+ strategy, FirstNet will begin 5G (Sub-6) service in select cities, stay tuned for details.

The FirstNet Dedicated Public Safety Grade Core

An **Enhanced** and **Dedicated** FirstNet Core network has been deployed adding 5G to the existing 4G LTE access. This **Upgraded** Core supports increased capacity with much higher throughput speeds.

Additionally, the new FirstNet 5G Core enables quick deployments of additional User Planes, allowing packet processing and traffic aggregation to be performed closer to the network edge, to increase bandwidth efficiencies.

FREQUENCIES OF 5G

AM Radio
FM Radio

Satellite Radio

5GHz Wi-Fi

6 GHz

100 GHz

Low Band   **Mid Band**   **High Band**

Band-12
700 MHz
4G LTE

Band-14
760 MHz
4G LTE

Band-5
850 MHz
4G LTE +
5G Sub-6

Band-66
1700 MHz
4G LTE +
5G Sub-6

Band-2
1900 MHz
4G LTE +
5G Sub-6

Band-30
2300 MHz
4G LTE

n260
39 GHz
5G+ mmWave
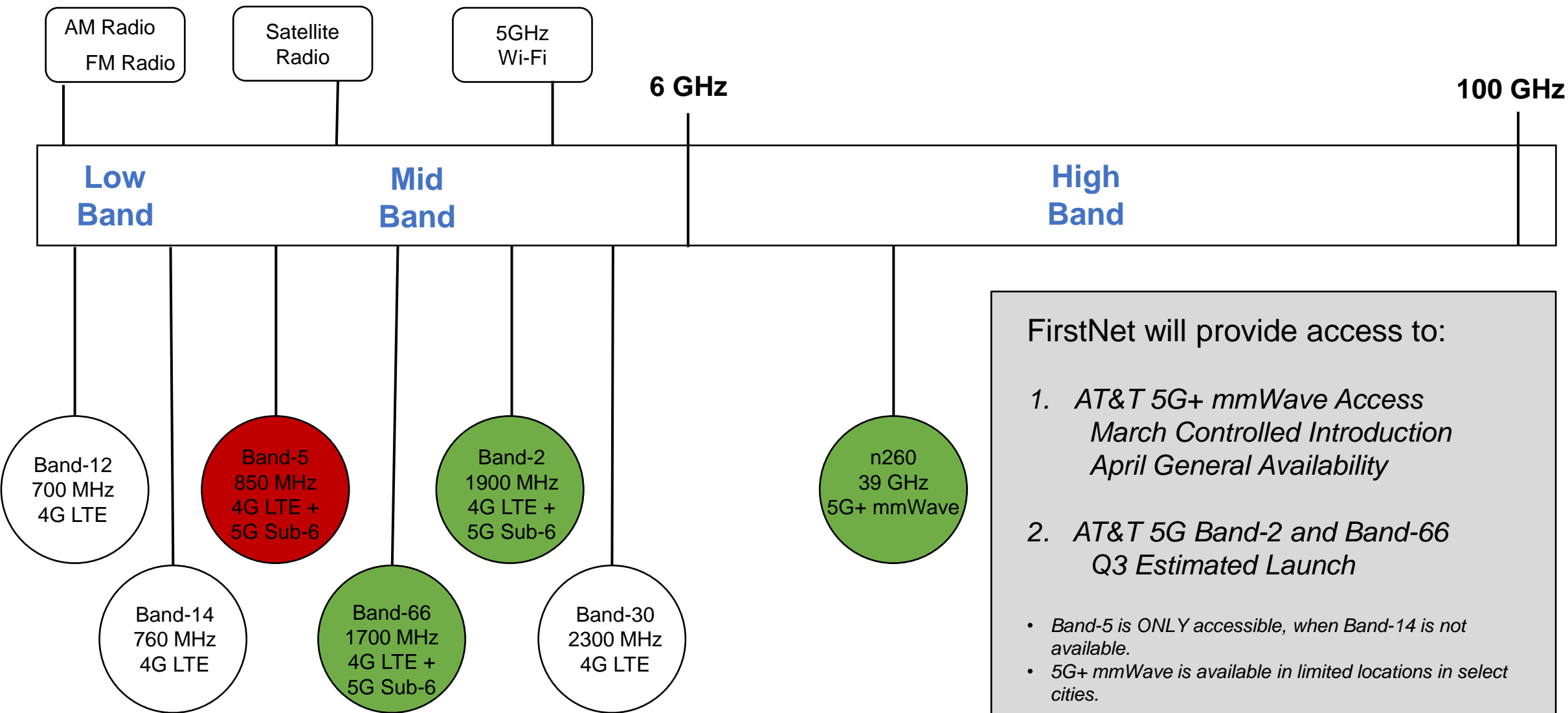
FirstNet will provide access to:

1. *AT&T 5G+ mmWave Access*
   March Controlled Introduction
   April General Availability

2. *AT&T 5G Band-2 and Band-66*
   Q3 Estimated Launch

- *Band-5 is ONLY accessible, when Band-14 is not available.*
- *5G+ mmWave is available in limited locations in select cities.*

What is 5G?

The key is understanding spectrum – The flavors of 5G.

5G → 5G
EVOLUTION
Also known as Sub-6

5G+

Low (Coverage)

Mid (Capacity/ Speed)

mmWav (Fiber-like Speeds)

5G

Connected Vehicle
Transformation

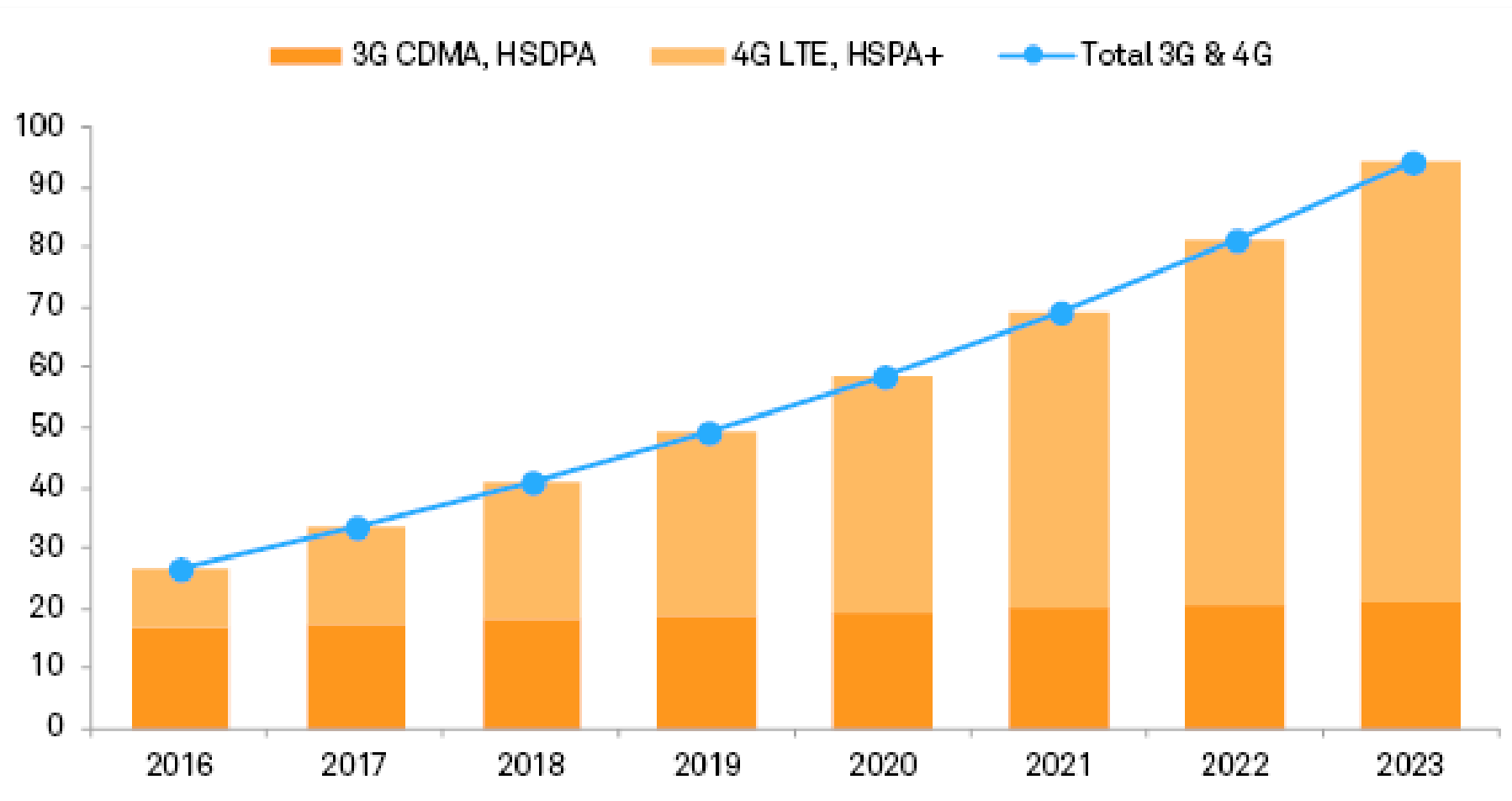5G connectivity has the potential to allow accident-free, stress-free and emission-free driving...and we think that's a future we can all be excited about.

AT&T Business

Cautionary language concerning forward-looking statements

Information set forth in this presentation contains forward-looking statements that are subject to risks and uncertainties, and <u>your mileage might differ</u> materially.

AT&T Business

US Automotive Installed base forecast
cars with in-vehicle cellular

Legend: 3G CDMA, HSDPA | 4G LTE, HSPA+ | Total 3G & 4G

Chart: US Automotive Installed base forecast, cars with in-vehicle cellular, 2016–2023 (values in millions, y-axis 0–100)

Interesting Industry Facts

- Industry CAGR = 20%
- AT&T CAGR = 57%
- Pre 2018 basic 3G telematics
- 2018 4G LTE surpassed 3G
- 4G LTE primary CC network into 2024
- 5G coming to automotive industry in 2024
- V2X – Vehicle-to-Everything will be driven by 5G

Data compiled June 2019.
Sources: Industry data; Kagan estimates
Kagan, a media research group within the TMT offering of S&P Global Market Intelligence.
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AT&T Business

AT&T 5G will transform the Connected Car experience

In-car video and gaming

Advanced driver assistance

Smart car control

Real-time diagnostics

Vehicle to Anything (V2X)

HD Mapping

Factory Automation

AT&T Business
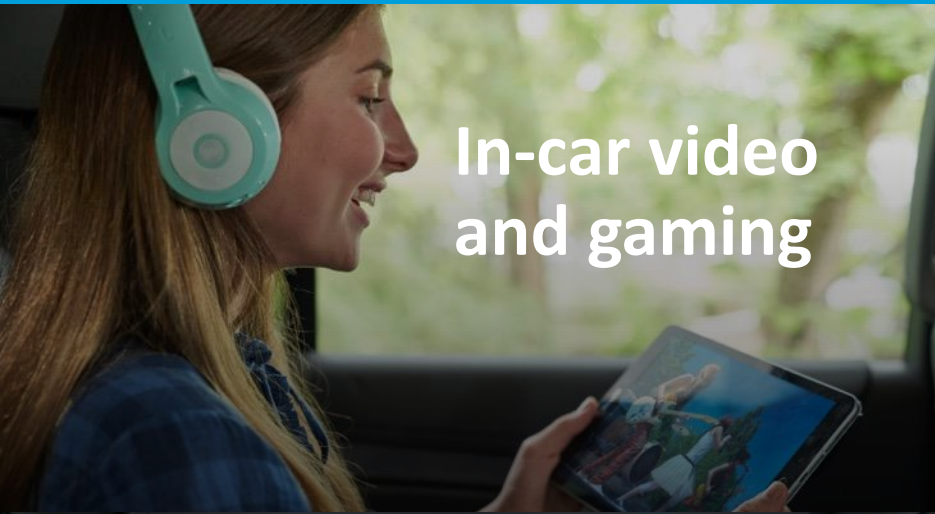
The Automotive Industry is in Transition

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE) AUTOMATION LEVELS

Full Automation

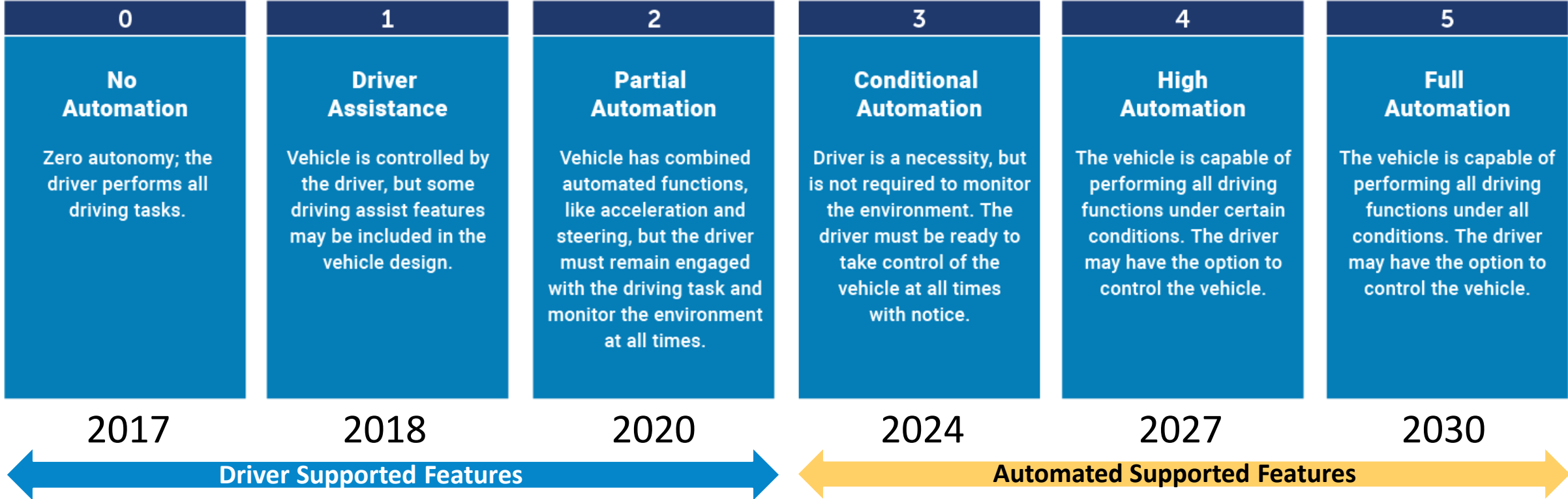| 0	1	2	3	4	5
No Automation	**Driver Assistance**	**Partial Automation**	**Conditional Automation**	**High Automation**	**Full Automation**
Zero autonomy; the driver performs all driving tasks.	Vehicle is controlled by the driver, but some driving assist features may be included in the vehicle design.	Vehicle has combined automated functions, like acceleration and steering, but the driver must remain engaged with the driving task and monitor the environment at all times.	Driver is a necessity, but is not required to monitor the environment. The driver must be ready to take control of the vehicle at all times with notice.	The vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.	The vehicle is capable of performing all driving functions under all conditions. The driver may have the option to control the vehicle.
2017	2018	2020	2024	2027	2030

Driver Supported Features

Automated Supported Features

AT&T Business

Autonomous Vehicles in the News

a broad array of what is possible

Domino's AV Test With Nuro Is A Picture Of Future Pizza Delivery

Dale Buss Contributor ⓘ
Cars & Bikes
I am grounded in autos but range broadly.

Delivery bots get green light to serve city

Brennon Dixson - 2 weeks ago - News , Robot delivery service , Robots

5G and Connected Car/ November 6, 2020 / © 2020 AT&T Intellectual Property

AT&T Business

Autonomous Vehicles in the News

a broad array of what is possible

A driverless Waymo got stuck in traffic and then tried to run away from its support crew

A rare unedited look at an autonomous vehicle in distress

By Andrew J. Hawkins | @andyjayhawk | May 14, 2021, 3:22pm EDT

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AT&T Business

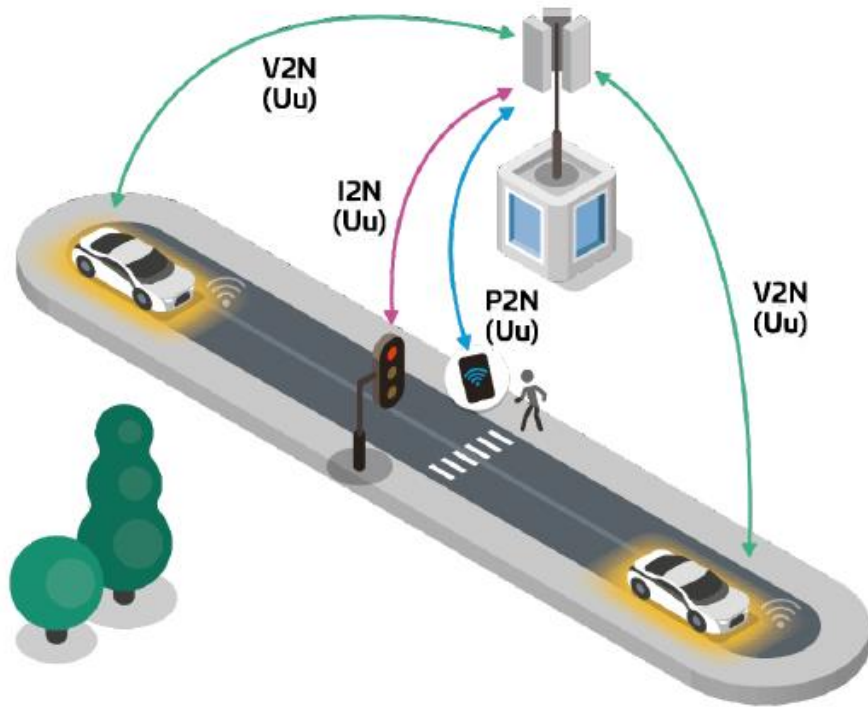# Autonomous Vehicles in the News

a broad array of what is possible

Las Vegas plans autonomous vehicle deployment in medical district

AT&T Business

Understanding C-V2X
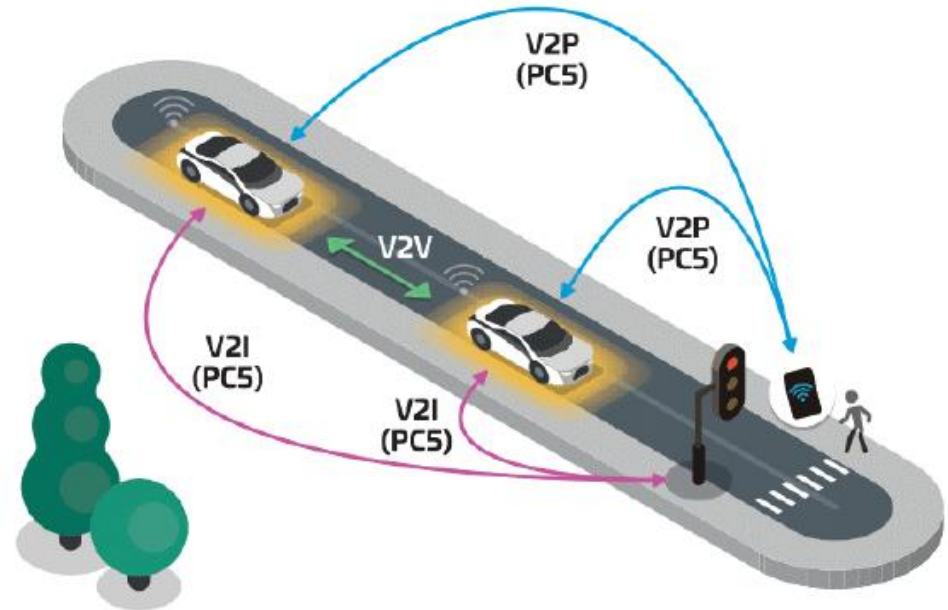
a key enabler in the Connected Car evolution

Network based

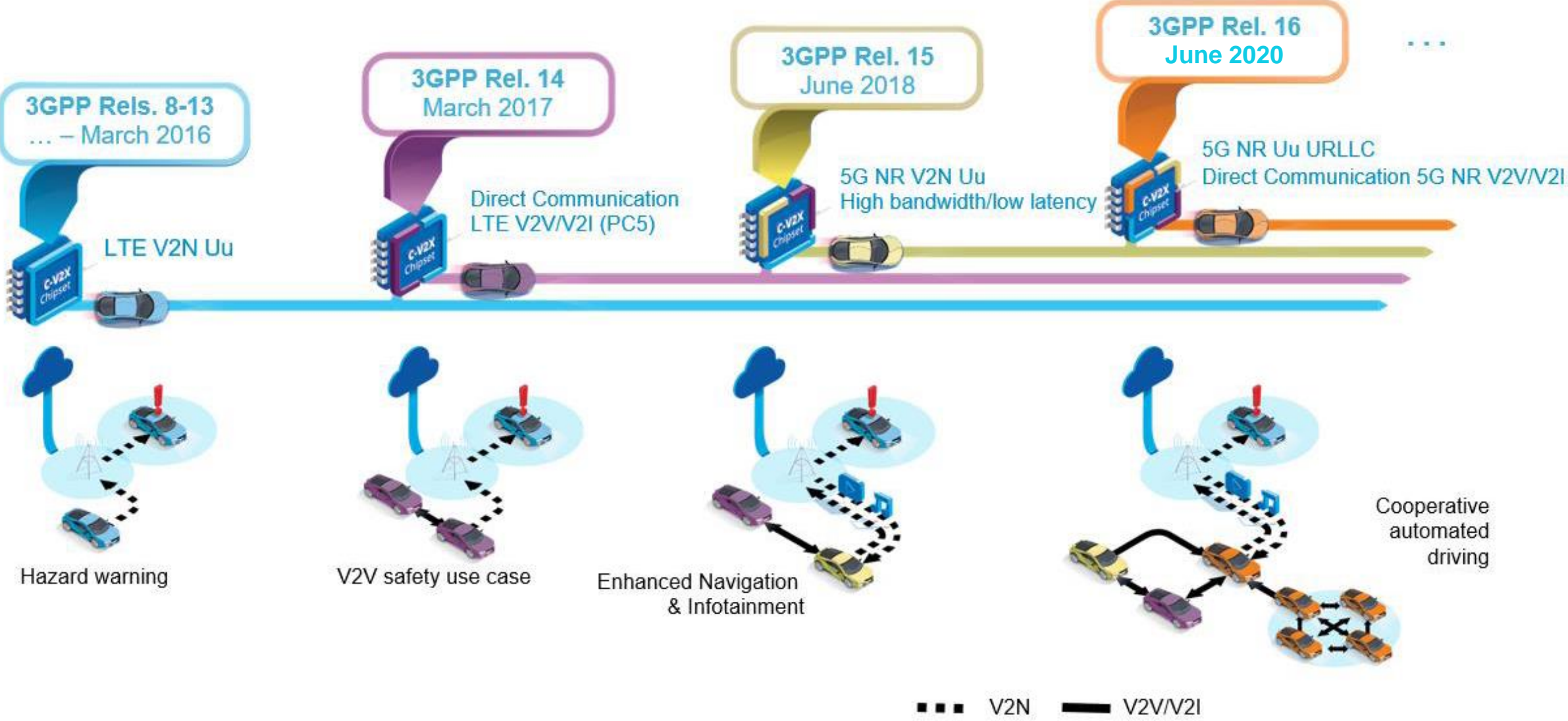**V2N/I2N/P2N** in bands designated for mobile communication networks

V2N (Uu)

I2N (Uu)

P2N (Uu)

V2N (Uu)

Direct

V2V/V2I/V2P in ITS bands (e.g. ITS 5.9 GHz) independent of cellular network

V2P (PC5)

V2P (PC5)

V2V

V2I (PC5)

V2I (PC5)

Two complementary Communications Technologies

AT&T Business

5G 3GPP Standards and Release

Automotive Chipsets, Modules and TCU's

3GPP Release 15 (5G Phase 1) 3GPP Release 16 (5G Phase 2) 3GPP Release 17 (5G Phase 2)

| 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |

LTE C-V2X TCU's from various vendors (Rel 14)

LTE C-V2V/V2I In-vehicle commercial deployments

5G C-V2X chipsets from various vendors

5G C-V2X modules from various vendors

5G C-V2X TCU's from various vendors

5G-NR In-vehicle commercial deployments

AT&T Business

Expected 5G timelines for autos

Nationwide 5G by first-half 2020
- Nationwide sub-6
- 35 cities w/ mmWave[1]
- NSA[2] core

5G and LTE low latency core
- NSA TCU modules
- AT&T low-latency 5G NSA core

Rel. 16 implementation
- Possible early SA[2] core availability

5G SA module availability
- SA[2] TCU modules

5G modules in cars
- Early 5G car volume

| 1H 2020 | 2H 2020 | 1H 2022 | 2H 2022 | 2024 |

Continuous investment in 4G LTE

- Nationwide 5Ge coverage
- LTE License assisted access in 24 cities

- Over 1,000 new sites are planned as part of the initial nationwide FirstNet expansion
- U.S. & Mexico LTE-M, NB-IoT networks

1. mmWave = millimeter wave
2. NSA = Non-standalone 5G. SA = Standalone 5G

AT&T Business

INFRASTRUCTURE READINESS WORK PLAN & TACTICAL ACTIONS

AT Readiness – Adam Shell

- National Roadway Integration of Automated Driving Systems Concept of Operations

- FHWA Research Report - Impacts of Automated Vehicles on Highway Infrastructure

Improve Pavement Markings – Adam Shell & Clayton Burke(Iowa DOT)

- MUTCD Update

- Pavement Marking Dashboard Update

INFRASTRUCTURE READINESS WORK PLAN & TACTICAL ACTIONS

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- **National Roadway Integration of Automated Driving Systems Concept of Operations**

- FHWA Research Report - [Impacts of Automated Vehicles on Highway Infrastructure](#)

Improve Pavement Markings – Adam Shell & Clayton Burke(Iowa DOT)

- MUTCD Update

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National Roadway Integration of Automated Driving Systems Concept of Operations

Overview

- Expected Late 2021

- Support the integration of ADS by 2035, in an anticipated mixed fleet environment

- Living Document

National Roadway Integration of
Automated Driving Systems (ADS)

Concept of Operations

Strawman Draft

April 2021

U.S. Department of Transportation
Federal Highway Administration

Draft Document Outline

1. Introduction
2. Key Terms
3. Current System Context for ADS in the Transportation System
    1. Safe System Approach
4. Overarching Principles for ADS Integration
5. Potential ADS Use Cases
    a. Freight & Package Delivery
    b. Automated Transit
    c. Individual Travel & Commuting
    d. Automated Agency Fleets
6. Operational Concept for ADS Integration
7. Scenarios
8. References
9. Support Information – System Integration Needs by Use-Case
10. Supporting Information – Safe System Approach Linkages
11. Supporting Information – Traceability Matrix

Operational Concept for ADS Integration
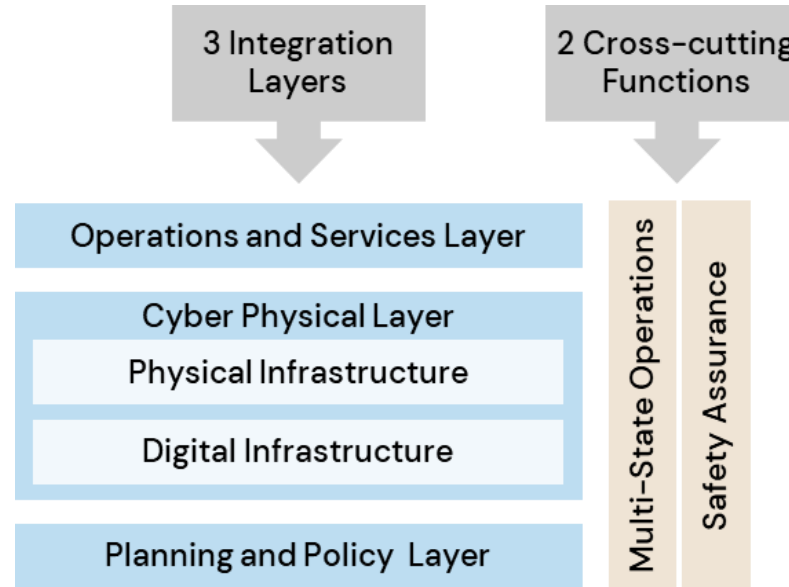
Beta Sites – Input from State DOTs & other local partners

Physical Infrastructure	WA	OH	TX	CO
Digital Infrastructure	IA	TN	MI	GA
Planning/Policy	MN	PA	FL	WA
Operations and Transportation Services	MD	AZ	CA	CT

INFRASTRUCTURE READINESS WORK PLAN & TACTICAL ACTIONS

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- **FHWA Research Report -** Impacts of Automated Vehicles on Highway Infrastructure

Improve Pavement Markings – Adam Shell & Clayton Burke(Iowa DOT)

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Impacts of AVs on Highway Infrastructure

Impacts of Automated Vehicles on Highway Infrastructure

PUBLICATION NO. FHWA-HRT-21-015   MARCH 2021

U.S. Department of Transportation
Federal Highway Administration

Research, Development, and Technology
Turner-Fairbank Highway Research Center
6300 Georgetown Pike
McLean, VA 22101-2296

- Purpose: provide information to stakeholders as they prepare for the deployment of AVs

- Research focused on two broad areas:
  - Advanced Driver Assistance Systems (ADAS) – SAE Levels 1 & 2 (Currently Operating)
  - Automated Driving Systems (ADS) – SAE Levels 3 to 5 (Possible Impacts)

- Infrastructure Categories
  - Physical Infrastructure (e.g. pavements, bridges, culverts)
  - Traffic Control Devices and other roadside infrastructure
  - Transportation Systems Management & Operations and Intelligent Transportation Systems infrastructure
  - Urban multimodalal infrastructure

- Research Sources of Information
  - Literature Review
  - AV Industry Interviews
  - National Stakeholder Workshops

Impacts of AVs on Highway Infrastructure

Impacts of Automated Vehicles on Highway Infrastructure

PUBLICATION NO. FHWA-HRT-21-015   MARCH 2021

U.S. Department of Transportation
Federal Highway Administration

Research, Development, and Technology
Turner-Fairbank Highway Research Center
6300 Georgetown Pike
McLean, VA 22101-2296

Importance of pavement markings

- Based on the research…**pavement markings currently appear to be the foremost infrastructure priority** in terms of how Infrastructure Owner Operators (IOOs) can **support AV deployment**

- For ADAS technologies, pavement markings provide technology-neutral information

- For ADS developers, the stated reliance on pavement markings was not consistent

- Some ADS developers indicate they are focused on what is currently available and will not count on changes to roadway infrastructure

INFRASTRUCTURE READINESS WORK PLAN & TACTICAL ACTIONS

AT Readiness – Adam Shell

- National Roadway Integration of Automated Driving Systems Concept of Operations

- FHWA Research Report - Impacts of Automated Vehicles on Highway Infrastructure

Improve Pavement Markings – Adam Shell & Clayton Burke(Iowa DOT)

- **MUTCD Update**

- Pavement Marking Dashboard Update

FHWA MUTCD Rulemaking: Updates to Support Highway Safety & AV Technologies

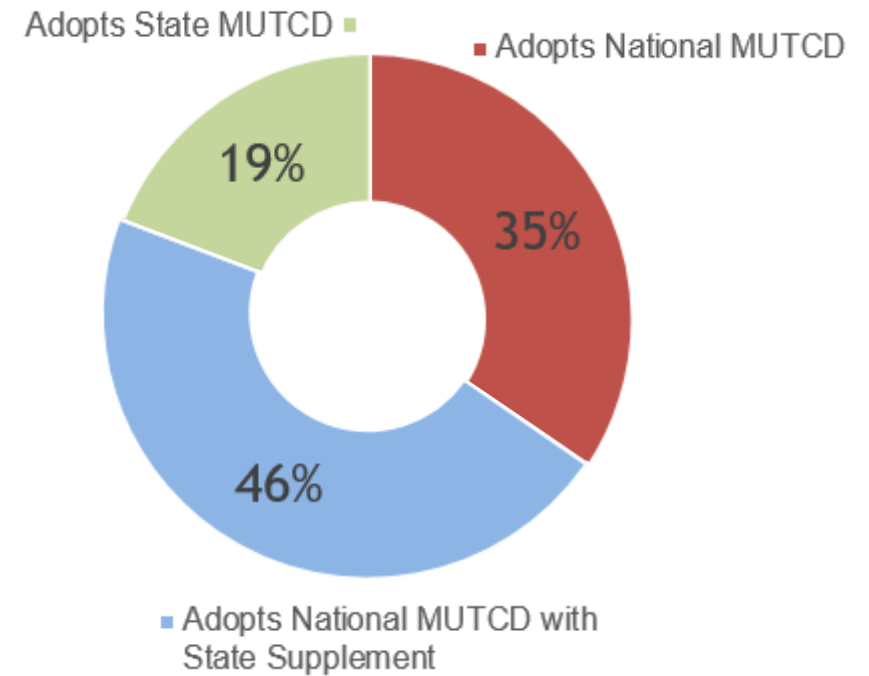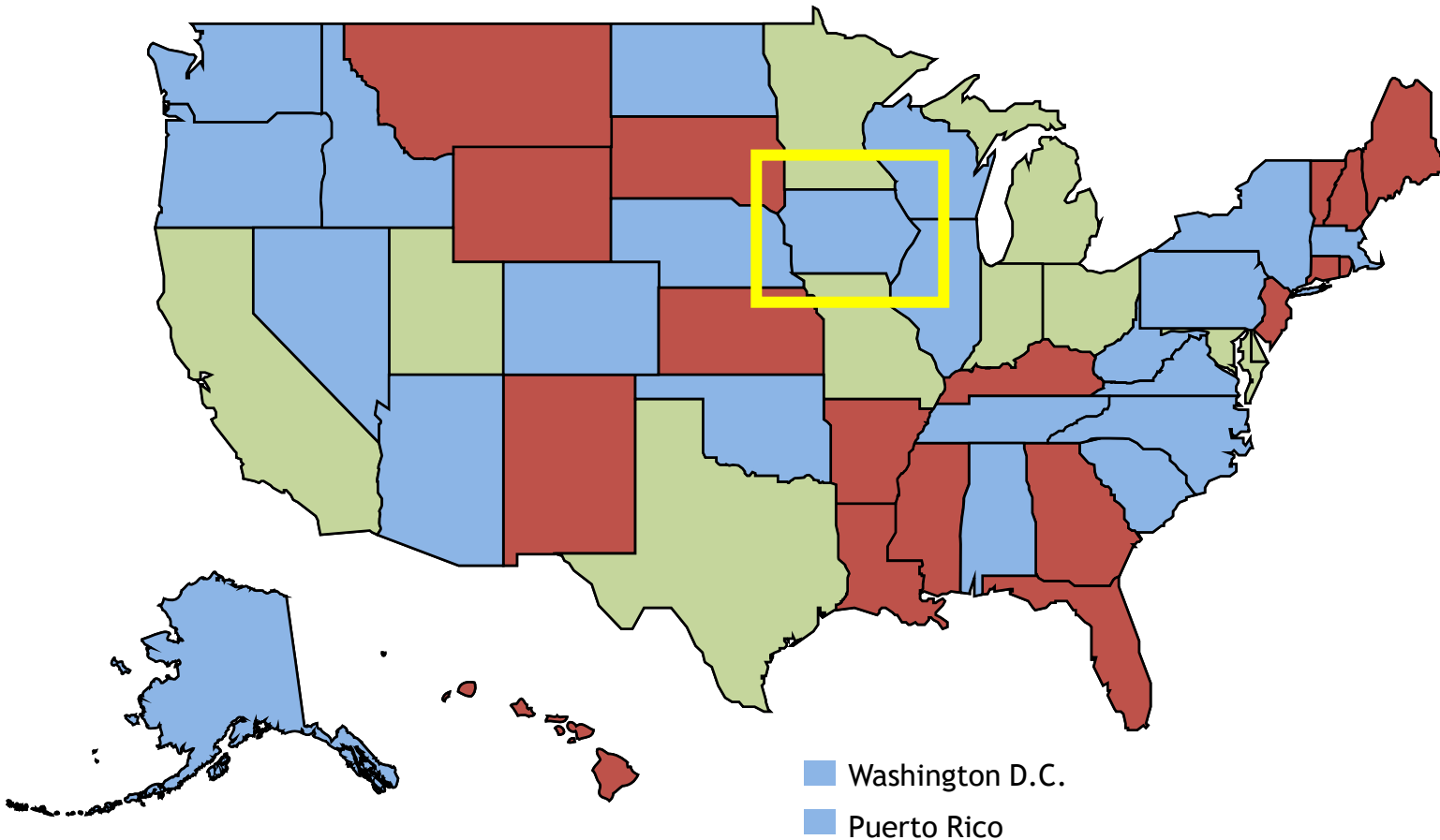# Manual on Uniform Traffic Control Devices

<u>Overview</u>

- National Standard for Traffic Control Devices (TCDs) on all roads open to public travel in the United States

- A **human-centered, data-driven** safety and operational protocol

- **Effective** traffic control

- **Uniform system** of signs, signals, and markings

- **Ultimately, the MUTCD is about the road user**
  - Pedestrians
  - Bicyclists
  - Motorists
  All with differing levels of abilities and limitations

Source: https://mutcd.fhwa.dot.gov/

The MUTCD is published by the Federal Highway Administration (FHWA) under 23 Code of Federal Regulations (CFR), Part 655, Subpart F

MUTCD Adoption by State & Territory

Legend:
- Adopts State MUTCD
- Adopts National MUTCD
- Adopts National MUTCD with State Supplement

Pie chart:
- 35% — Adopts National MUTCD
- 46% — Adopts National MUTCD with State Supplement
- 19% — Adopts State MUTCD

- Washington D.C.
- Puerto Rico

Source: https://mutcd.fhwa.dot.gov/resources/state_info/index.htm

MUTCD in Iowa

TRAFFIC OPERATIONS
CHAPTER 130
SIGNING MANUAL

[Prior to 6/3/87, Transportation Department[820]—(06,K) Ch 2]

761—130.1(321) Manual. The "Manual on Uniform Traffic Control Devices" (MUTCD), 2009 Edition with Revision Numbers 1 and 2, dated May 2012, published by the U.S. Department of Transportation, Federal Highway Administration, shall constitute the manual and specifications for a uniform system of traffic control devices for use upon the highways of this state.

130.1(1) The department makes the following exception to the MUTCD for school zones: In Part 2, Section 2B.04, paragraph 12, of the MUTCD, Right-of-Way at Intersections, Standard, in lieu of the sentence "Portable or part-time STOP or YIELD signs shall not be used except for emergency and temporary traffic control zone purposes," the department adopts the following: "Portable or part-time STOP signs may be used only in the following situations:

"1. When necessary for emergency and temporary traffic control zone purposes, or

"2. In school zones at appropriate school crosswalks."

130.1(2) Copies of the MUTCD are available for examination at the Office of Traffic and Safety, Iowa Department of Transportation, 800 Lincoln Way, Ames, Iowa 50010. The MUTCD is also available on the Internet at http://mutcd.fhwa.dot.gov.

This rule is intended to implement Iowa Code sections 321.249 and 321.252.

Source: https://www.legis.iowa.gov/publications/search/document?fq=id:505695&pdid=701258#761.130.1

Lane and Edge Line Widths

- Based on Research on both Human Drivers and Safety, and Automated Driving Systems

- Propose **Normal-width** lines as
  - ☐ 6" wide for freeways
  - ☐ 6" wide where speed limit greater than 40 mph
  - ☐ 4" to 6" wide for all other roadways

- Propose **Wide lines** as
  - ☐ 8" wide where 4" to 5" normal lines are used
  - ☐ 10" wide where 6" normal lines are used

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Summary of Iowa Public Road Lane Miles

Road Network Class	Lane Miles	Lane Miles, Speed > 40 MPH
Interstate	3,893	3,844
Non-Interstate Primary	20,736	19,006
County Secondary	38,161	35,569
Municipal Local	30,139	1,681
Total	92,929	60,100

Note: includes only paved roads and entrance/exit ramps

Autonomous Vehicles

- New Part, **not a requirement**
- Provide agencies interested in AV systems with set of criteria
- **Agencies decide** **whether to fit roads for AVs**
- Address current body of knowledge
- Expect systems to continue to evolve

> *There is __no__ requirement proposed to fit roads and streets for Autonomous Vehicle systems.*

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Autonomous Vehicles

- Considerations proposed to accommodate AVs
- **No requirement to fit roads for AVs**
- Recommended factors include
  - ☐ Line widths
  - ☐ Sign orientation
  - ☐ Refresh/flicker rate for LED signs, signals
  - ☐ "Ghost" lines in Work Zones

> *The MUTCD addresses traffic control devices only. Vehicle systems are outside the scope of the MUTCD.*

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MUTCD Update Rulemaking Process

- Why "rulemaking"?
  - Official process for public review and comment
  - Balance views and needs of all stakeholders

Public rulemaking ensures all perspectives are considered

- Frequency of Updates
  - Last new MUTCD was 2009
  - Average 8 years between editions (not including revisions)
  - New plan – **more frequent updating** through revisions, every few years

INFRASTRUCTURE READINESS WORK PLAN & TACTICAL ACTIONS

AT Readiness – Adam Shell

- National Roadway Integration of Automated Driving Systems Concept of Operations

- FHWA Research Report - Impacts of Automated Vehicles on Highway Infrastructure

Improve Pavement Markings – Adam Shell & Clayton Burke(Iowa DOT)

- MUTCD Update

- **Pavement Marking Dashboard Update**

OPEN DISCUSSION

INFORMATION AND KEY UPCOMING DATES

- Policy & Legislation Subcommittee Meeting – Wed., June 2nd, 1-2PM

- Public Safety & Enforcement Subcommittee Meeting – Wed., June 9th, 10-11AM

- AT Council Meeting - Late July or Early August 2021

THANK YOU