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The bridge to possible

Industry enablers making Private 5G a viable private networking option

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BRKSPM-2842

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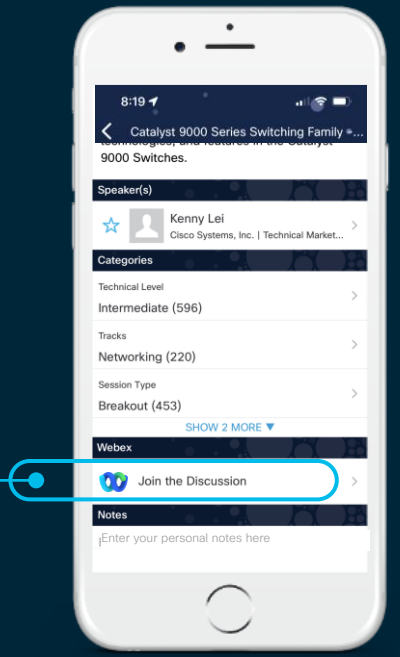

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Webex spaces will be moderated by the speaker until June 17, 2022.

Agenda

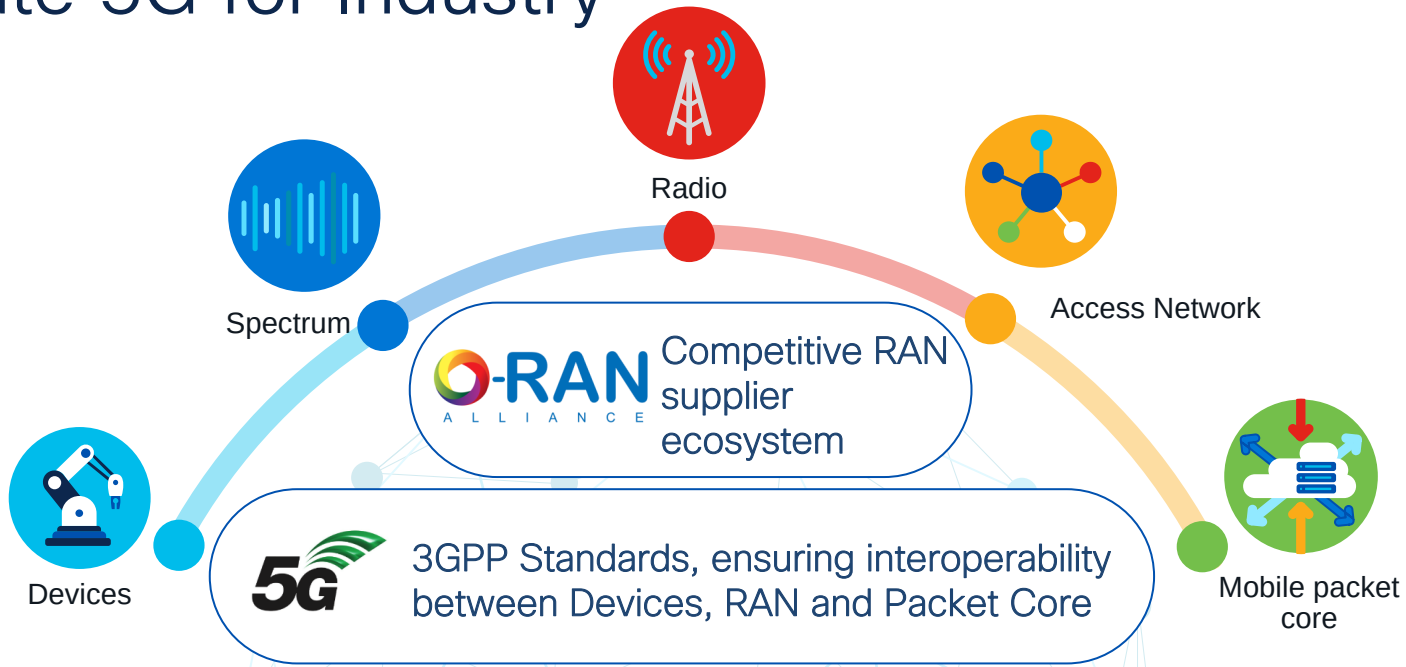
- Introduction
- Standards & Industry Organizations
- Spectrum for Private 5G
- Private 5G Deployment Models
- Conclusion

Introduction

What is Private 5G?

A private cellular network that is built using 3GPP 5G technology, dedicated to carrying traffic from a specific entity (e.g., an enterprise) in licensed radio spectrum

Private 5G for Industry



5GACIA Driving 5G requirements for the Industrial Manufacturing needs

Private 5G Use Cases

Use case examples

- Robotics Process Automation and Emergency Control
- AGVs and driverless vehicles
- High speed SW downloads
- Surveillance and measurement
  - AR/VR applications
  - Video
  - Sensor networks

- Autonomous forklifts, AGVs, AMRs for inventory logistics
- Distribution line/workflow automation
- Push to talk
- Location tracking

- Seamless coverage area
- Remote workers – for maintenance, repairs, data collection
- Video surveillance – remote safety
- Unmanned autonomous vehicles

Standards & Industry Organizations

5G-ACIA

5G Alliance for Connected Industries and Automation

- Driving 5G requirements for the Industrial Manufacturing needs
- Advancing standardization and regulation of 5G in the industrial domain
- Creation of white papers on Industrial 5G, covering migration to 5G and integration in connected industries
- Endorsed testbeds, covering capabilities and performance of 5G in actual industrial applications

5G-ACIA

Important Enablers for Industrial 5G

5G-ACIA

Activities & Achievements

Industrial 5G Devices

Aligned view on how to build an Industrial 5G device

Initiate Market Study

Accurate assessment and tracking of the overall Industrial 5G Market

IIoT 5G Capabilities

Analyze and explain specific features of 5G that are particularly relevant for the IIoT (Industrial IOT)

Integration with OPC UA

How to combine OPC UA with 5G in an efficient manner?

TSN over 5G

5G Digital Twins

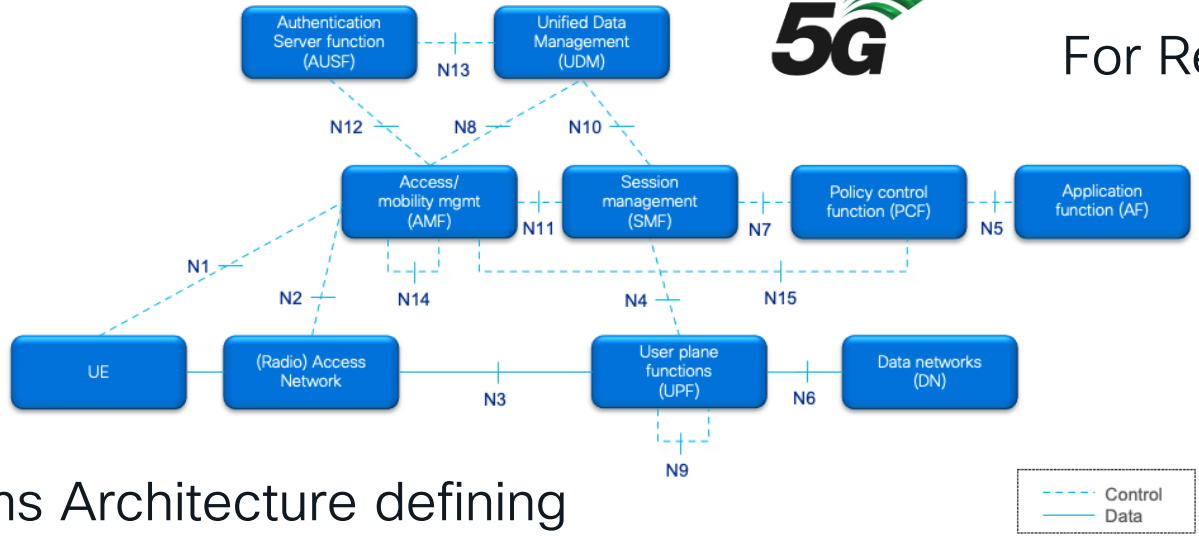
5G Exposure Interface

Security

Performance Testing

5GACIA Whitepapers
Free download at www.5g-acia.org

3GPP 5G Standards



For Reference

- 5G Systems Architecture defining
  - Functions
  - Network Interfaces
- Enabling interoperability

3GPP 5G Standards

3GPP Releases and Private 5G Features

Rel-18

Rel-17

New 5G NR Technologies

Enhanced Positioning, eURLLC, expand sidelink e.g., V2X, NR Light, New Spectrum above 52.6GHz

Rel-16

Industry Expansion

URLLC, TSN, Industrial IoT Positioning, eMBB evolution

Rel-15

eMBB Focused

Smartphones, PCs, CPEs MNOs & Private Networks

For more information see the session:
Evolution of Private 5G Networks Standards" (BRKSPG-1003)

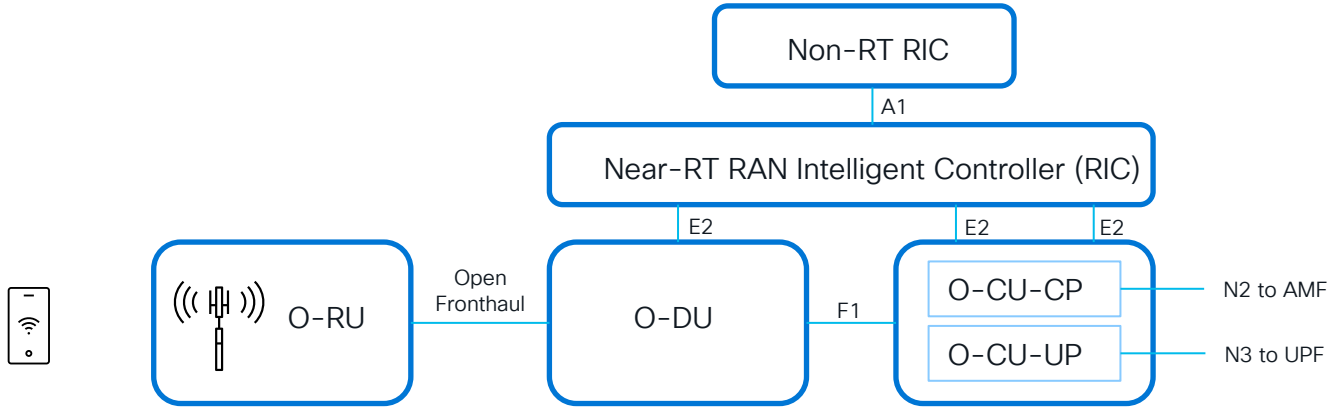
Rel-15 Commercialization

Commercialization of Rel-16, Rel-17

2018	2019	2020	2021	2022	2023+

O-RAN Alliance

Competitive RAN supplier ecosystem

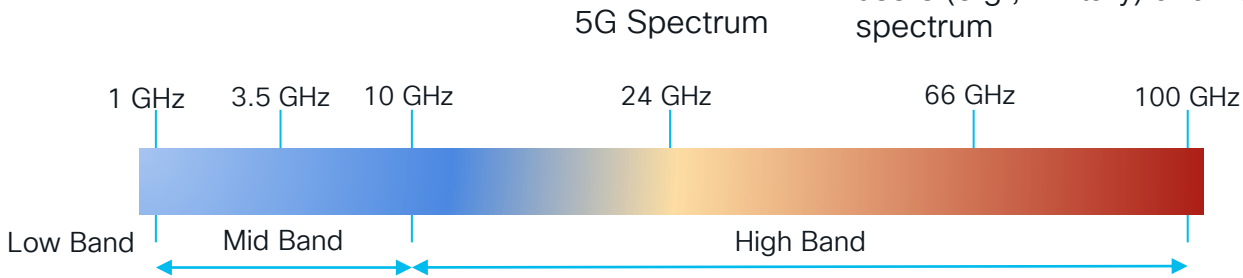


- O-RAN Architecture, foundation for virtualized RAN on open hardware and cloud, with AI-powered radio control.
  - Architecture base on standards defined by O-RAN Alliance
  - Fully supporting and complementing 3GPP standards

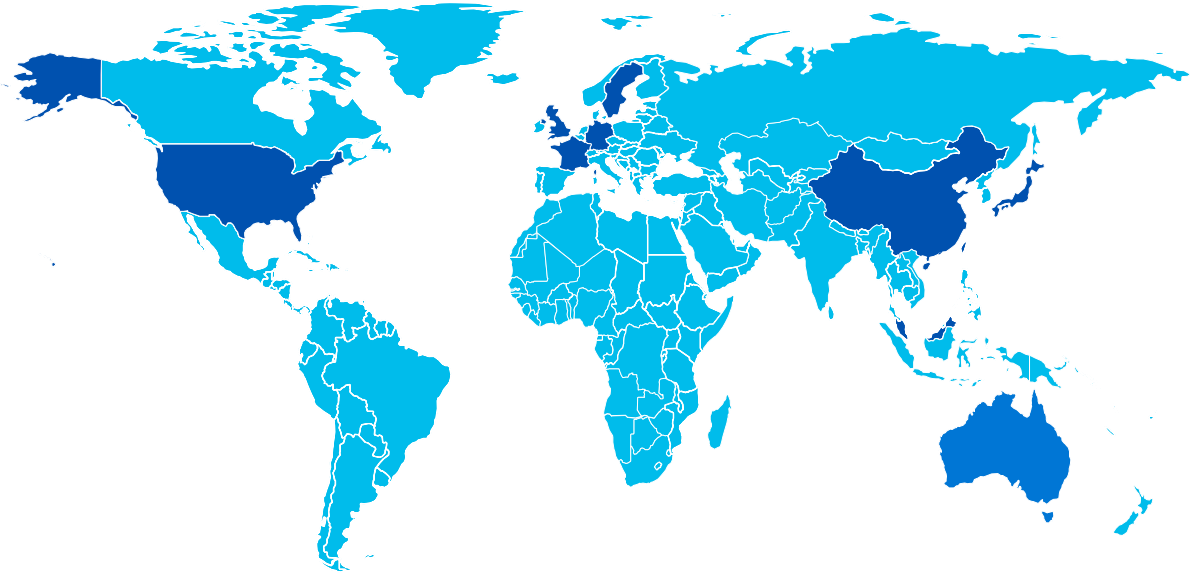
Spectrum for Private 5G

5G Spectrum

- Types of Spectrum
  - Low bands (below 1GHz) to provide wide area and in-building coverage
  - Mid Bands (1-10GHz) supporting mixture of coverage and capacity
  - High bands (mmWave) supporting fastest 5G speeds but very limited coverage
- Availability of Spectrum
  - Mobile Operators secure exclusive spectrum licenses
  - Some national regulators setting aside a portion of spectrum for local / enterprise users (private spectrum)
  - CBRS (Citizens Broadband Radio Service)
    - US spectrum sharing framework in the 3.55 GHz to 3.7 GHz range, shared by incumbent users (e.g., military) and new users of the spectrum



Spectrum – Private Licenses

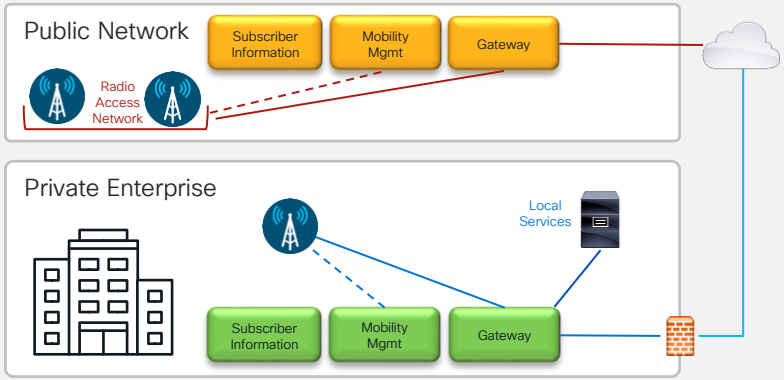


Private/Locally-licensed spectrum:		
U.S.: 3.55-3.7 GHz CBRS	Australia: 1.8, 2.1GHz, 26/28GHz	Brazil: TBD
U.K: 1.8, 2.3 GHz, 3.8-4.2 GHz	Hong Kong: 28 GHz	Mexico: TBD
Germany: 3.7-3.8 GHz. 26GHz	Japan: 4.8, 28.2 GHz	Argentina: TBD
Sweden: 3.7GHz	Taiwan: 4.8 GHz	Chile: TBD
France: 2.6 GHz, 3.8-4.0 GHz	China: 4.4-4.5GHz, 5.9-7.1 GHz	Canada: TBD
	Malaysia: 26.5-28.1 GHz	

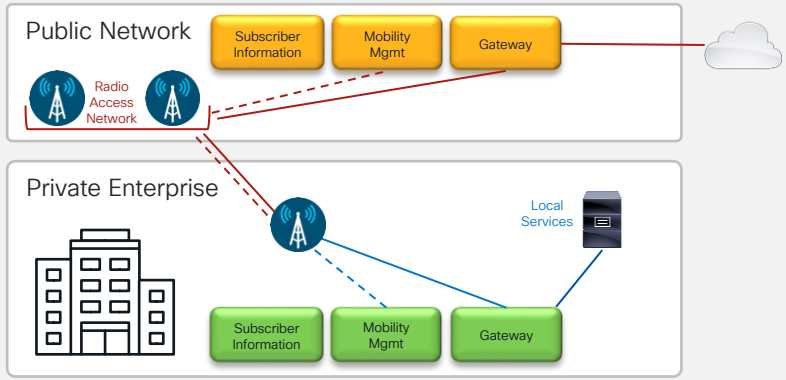
Private 5G Deployment Models

Non-Public Network Deployment Models

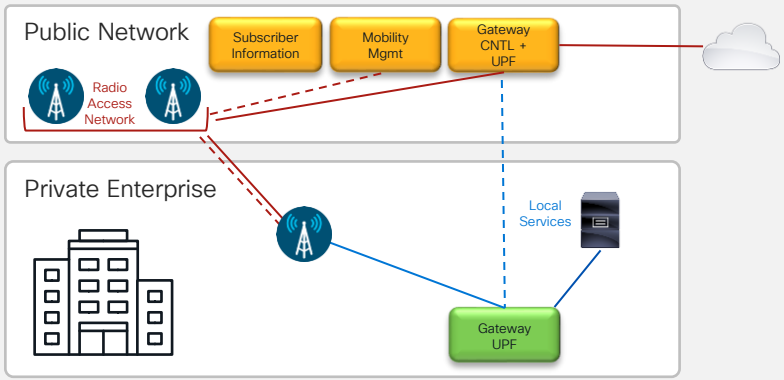
Isolated Network



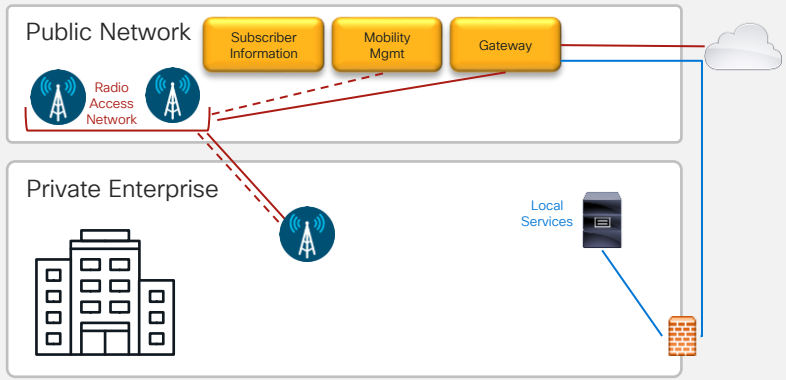
SP Shared RAN



SP Shared RAN and Control Plane



SP Shared RAN, Control Plane and User Plane

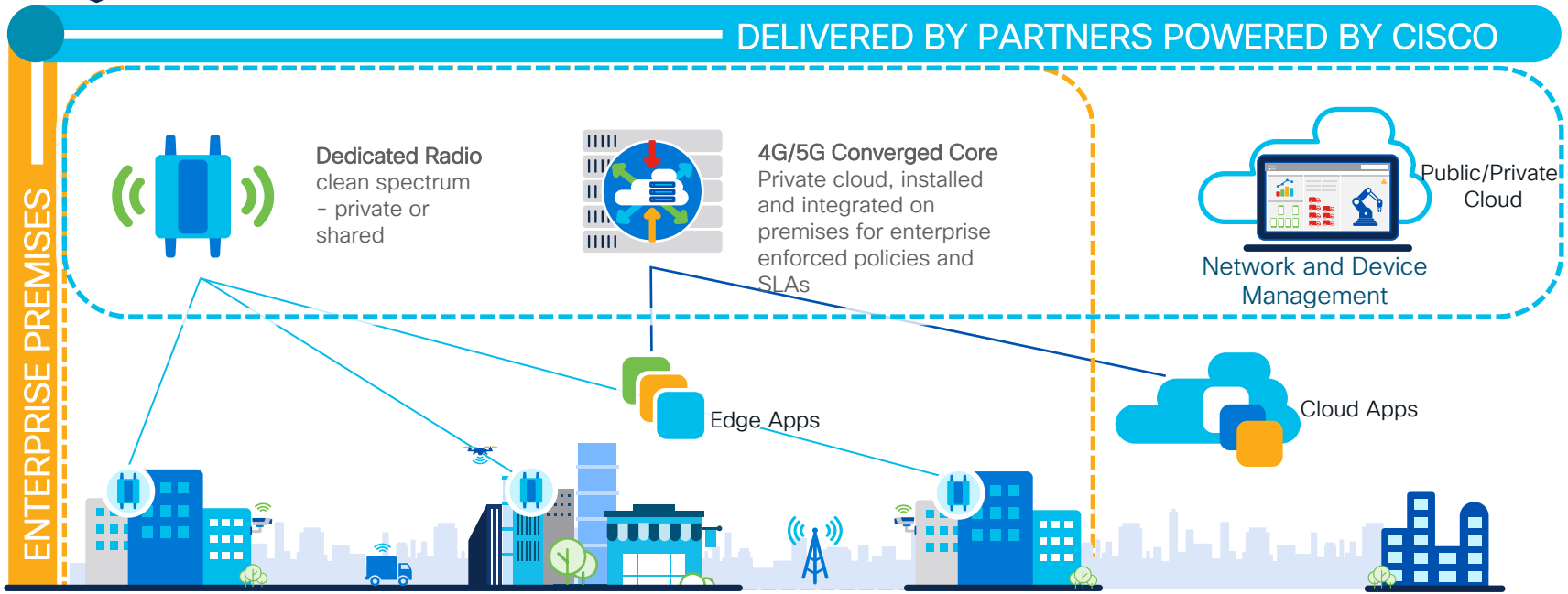


Cisco's Private 5G

A dedicated mobile network connecting people, machines and applications.

Automatic upgrades & enhancements

Intuitively simple operations and management. Integrating with enterprise systems for common visibility and control



Conclusion

Recommendations and Conclusions

- Recommendations
- Lean in to Private 5G to address Business Challenges and Industrial use cases
- Conclusions
- Need for standards
  - The enabler to deliver services that meet set requirements
  - Enables compatibility, interoperability, repeatability, healthy competition
- Spectrum Options
  - Different types of spectrum for use cases (sub 6 & mmWave)
  - Availability of spectrum, new availability direct to businesses in certain countries
- Deployment Models
  - Requirement for a scalable and repeatable solution that provides easy consumption of Private 5G

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