2019 IEEE Summer Session for Young Professionals
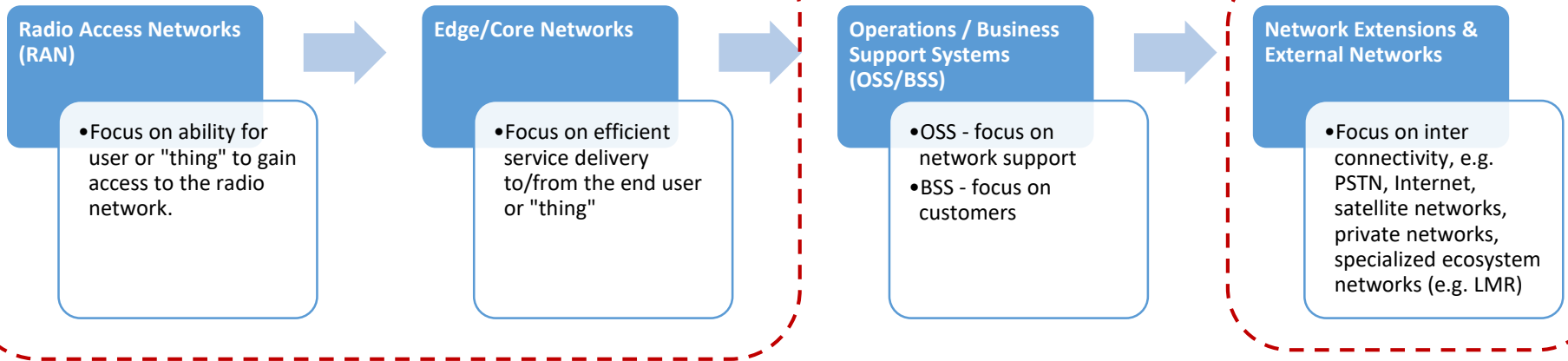
Education Working Group

Narendra Mangra

Mobility Ecosystem Topics
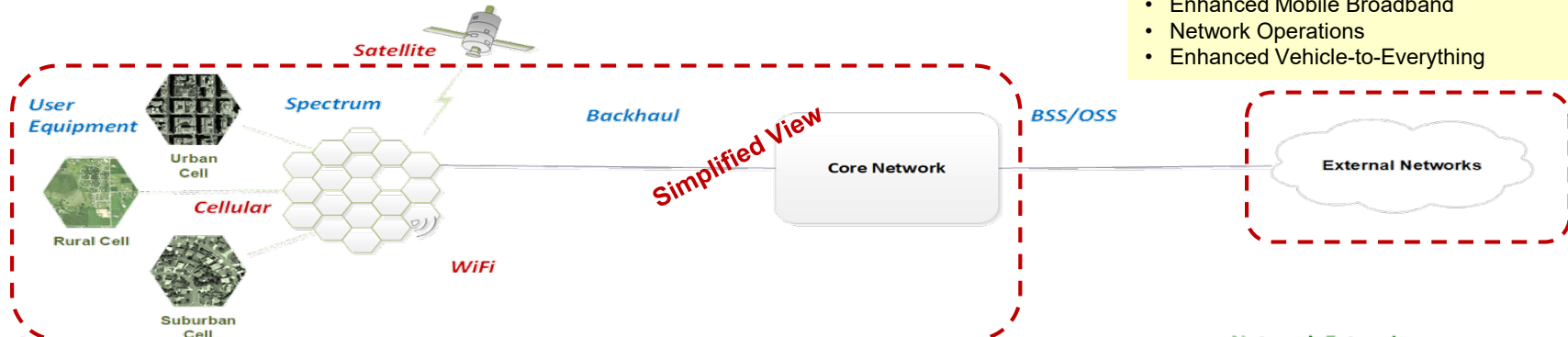
Radio Access Networks (RAN)

- Focus on ability for user or "thing" to gain access to the radio network.

Edge/Core Networks

- Focus on efficient service delivery to/from the end user or "thing"

Operations / Business Support Systems (OSS/BSS)

- OSS - focus on network support
- BSS - focus on customers

Network Extensions & External Networks

- Focus on inter connectivity, e.g. PSTN, Internet, satellite networks, private networks, specialized ecosystem networks (e.g. LMR)

5G Architecture & Deployments

Microgrids

Smart Cities Framework include the mobility and other smart city ecosystems

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Wireless Mobility Ecosystem Overview (Simplified View)

5G Enhancements
- Massive Machine Type Communications (MTC)
- Critical Communications
- Enhanced Mobile Broadband
- Network Operations
- Enhanced Vehicle-to-Everything

Broadband Communications Ecosystem

Spectrum
- 5G Global Harmonized Spectrum
- Country / Operator Spectrum

Devices
- Human Interface Devices: Mobile Phones
- MTC / IoT Sensors

Radio Access
- Cellular: 5G NR, 4G LTE, V2V
- WLAN: 802.11 (WiFi), DSRC
- Mobile Satellite Systems

Facilities
- Cells: Macro, Small (Micro, Pico, Femto)
- Structures: Towers, Buildings, Street Furniture

Backhaul
- Fiber
- Microwave, including 5G Fixed Wireless

Core Network
- Network Slicing
- Technology / Link Aggregation
- Traffic / Congestion Management, e.g. SDN
- Policy Control
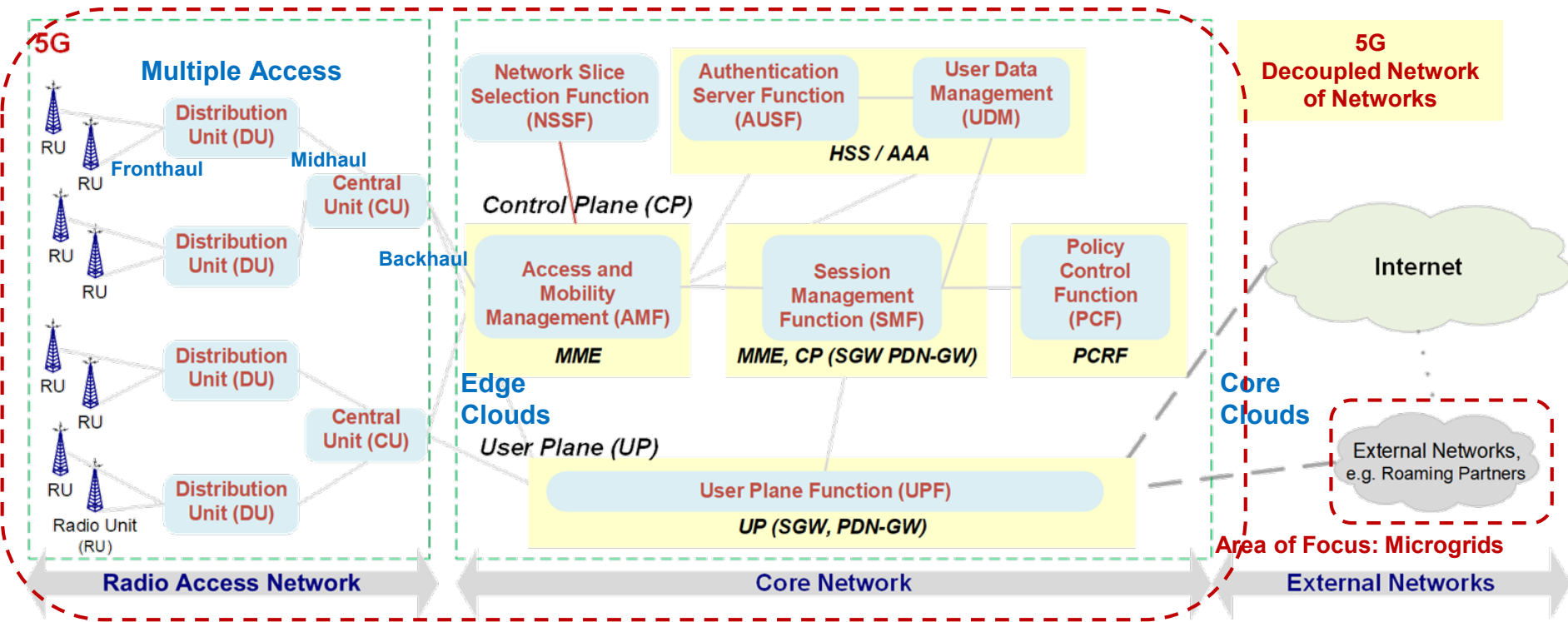- Communications Interoperability

BSS/OSS
- Data Analytics
- Business / Technical Operations, e.g. SLAs,
- Domestic / International Roaming Support (Data / Financial Exchanges)

Network Extensions
- Roaming
- Smart Cities Platforms
- Connected Vehicles
- Public Safety Communications
- MTC / IoT
- Connected Health
- Mobile Money
- Smart Buildings
- Smart Grids

5G Network Architecture

5G Decoupled Network of Networks

5G

Multiple Access

RU — Distribution Unit (DU)

Fronthaul — *Midhaul*

Central Unit (CU)

RU — Distribution Unit (DU)

Backhaul

RU — Distribution Unit (DU)

Central Unit (CU)

RU — Distribution Unit (DU)

Radio Unit (RU)

Radio Access Network

Network Slice Selection Function (NSSF)

Authentication Server Function (AUSF) — **User Data Management (UDM)**

HSS / AAA

Control Plane (CP)

Access and Mobility Management (AMF)

MME

Session Management Function (SMF)

MME, CP (SGW PDN-GW)

Policy Control Function (PCF)

PCRF

Edge Clouds

User Plane (UP)

User Plane Function (UPF)

UP (SGW, PDN-GW)

Core Network

Core Clouds

Internet

External Networks, e.g. Roaming Partners

Area of Focus: Microgrids

External Networks

OSS/BSS not shown

Area of Focus: 5G Architecture

Sources: 3GPP TS 23.501, ITU GSTR-TN5G

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Speakers

Title	Speaker
Welcome Remarks	
Introduction	Narendra Mangra, GlobeNet
5G RAN Overview	Noman Alam, Sprint
Antenna Design for 5G Back-Hauling and 5G Back-Hauling Requirements	Dr. Ahmed Kausar, VT iDirect
5G Architecture Overview	Dr. Srini Gottumukkala, OpusNet
5G Road to Realization	Bhupinderjit S. Mann, TeleWorld Solutions
Smart Cities Roadmap Framework	Narendra Mangra, GlobeNet
Microgrid 101	Dr. Liling Huang, George Mason University