

Small Cell / 5G CORE



Sub 6 GHz 5G small cell



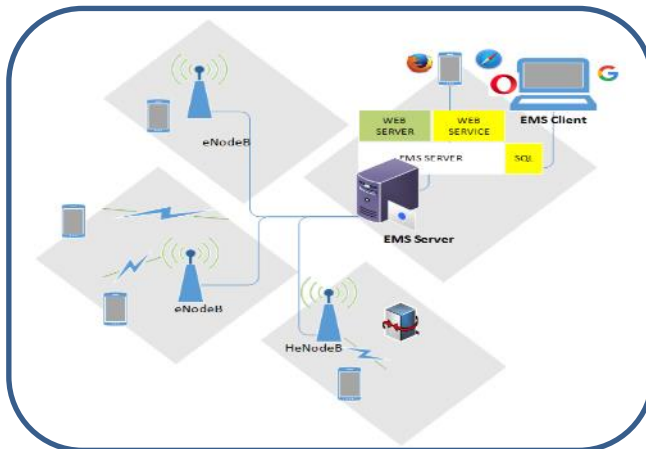
mmWave 5G small cell



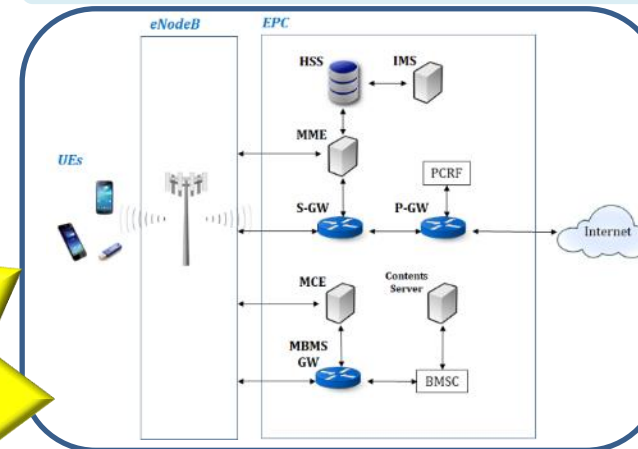
5G Core



EMS (element management system)



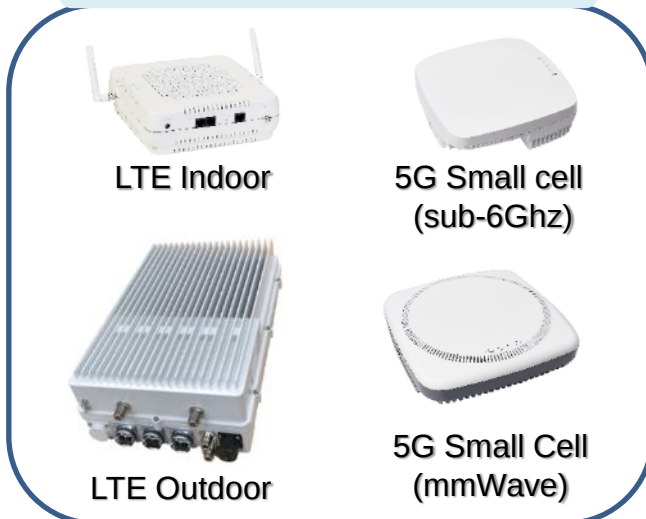
Core Network : EPC / 5G Core



**Field proven
at Korean/
Japanese
Market**

- Commercial
- Public Safety
- Military

4G/5G Base Station



Network in a Box

LTE/5G Anywhere

Portable LTE/5G combining
Core Network and Base Station



Backpack

Car/Ship Carrying



Korea

- Public Safety Network
- LTE Marine
- Maritime Police
- Military

Japan

- Enterprise Small Cell
- Public Safety Network

- CU / DU / RU Integrated
- Standard : 3GPP Release 15
- 5G NR SA
- NR-DC (NR NR Dual Connectivity) (2Q2024)
- Max 128 connected, 64 active users
- Sync. : GPS or IEEE1588v2



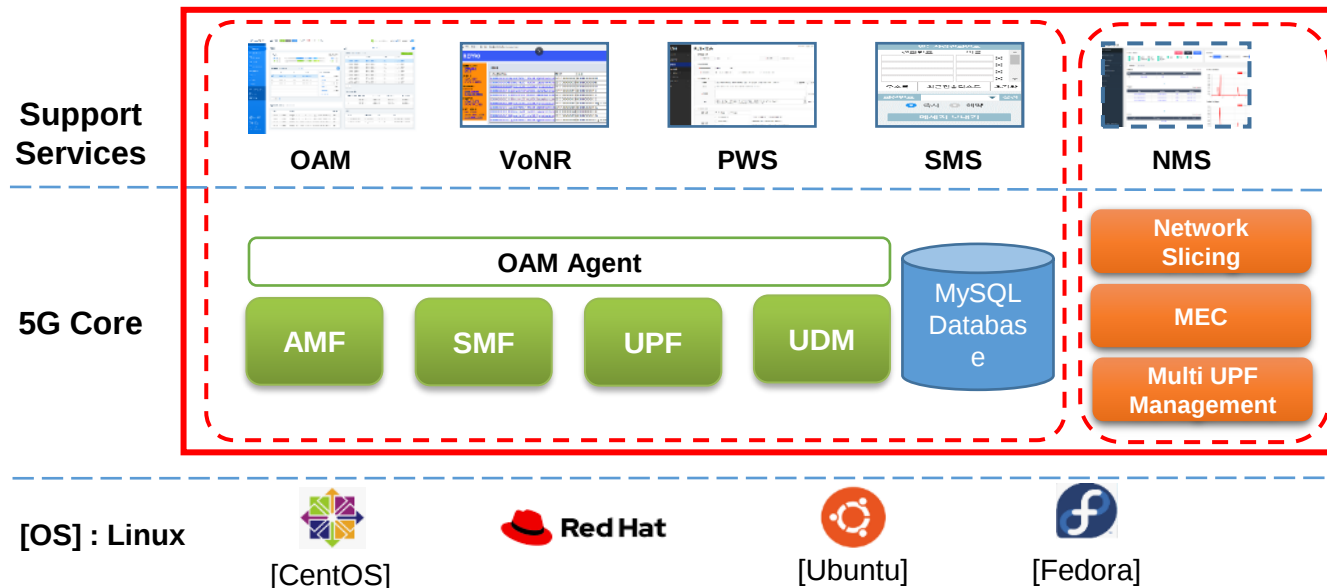
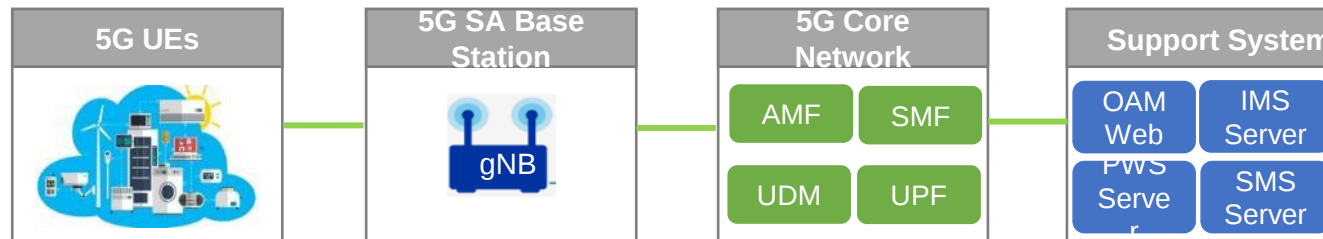
ITEM	Specification	Remark
Frequency (Band)	Sub 6GHz	n48, n77, n78, n79
Maximum Tx Power	23 dBm per antenna port	
Bandwidth	100MHz	2*100MHz (2Q2024)
Modulation	QPSK/16QAM/64QAM/256QAM	
Antenna	2T/2R	DL/UL: 2 layer
Backhaul	2.5Gbps NBase-T Ethernet	802.3 10GBase-X
Power	AC adaptor : AC 100~240V, 50/60Hz DC 12V	Using AC/DC adaptor,
Power Consumption	<25W	
Size (mm)	200(W) x 200(D) x 62(H)	
Weight	2.5 Kg	
Temperature	-5 ~ +40°C	
Installation	Wall Mount, Ceiling	

- CU (Central Unit) / DU (Digital Unit) / RU (Radio Unit) Integrated
- Standard : 3GPP Release 15
- 5G NR NSA
 - EN-DC (E-UTRAN NR Dual Connectivity)
 - NR-DC (NR NR Dual Connectivity) (2Q2024)
- Sync. : GPS or IEEE1588v2

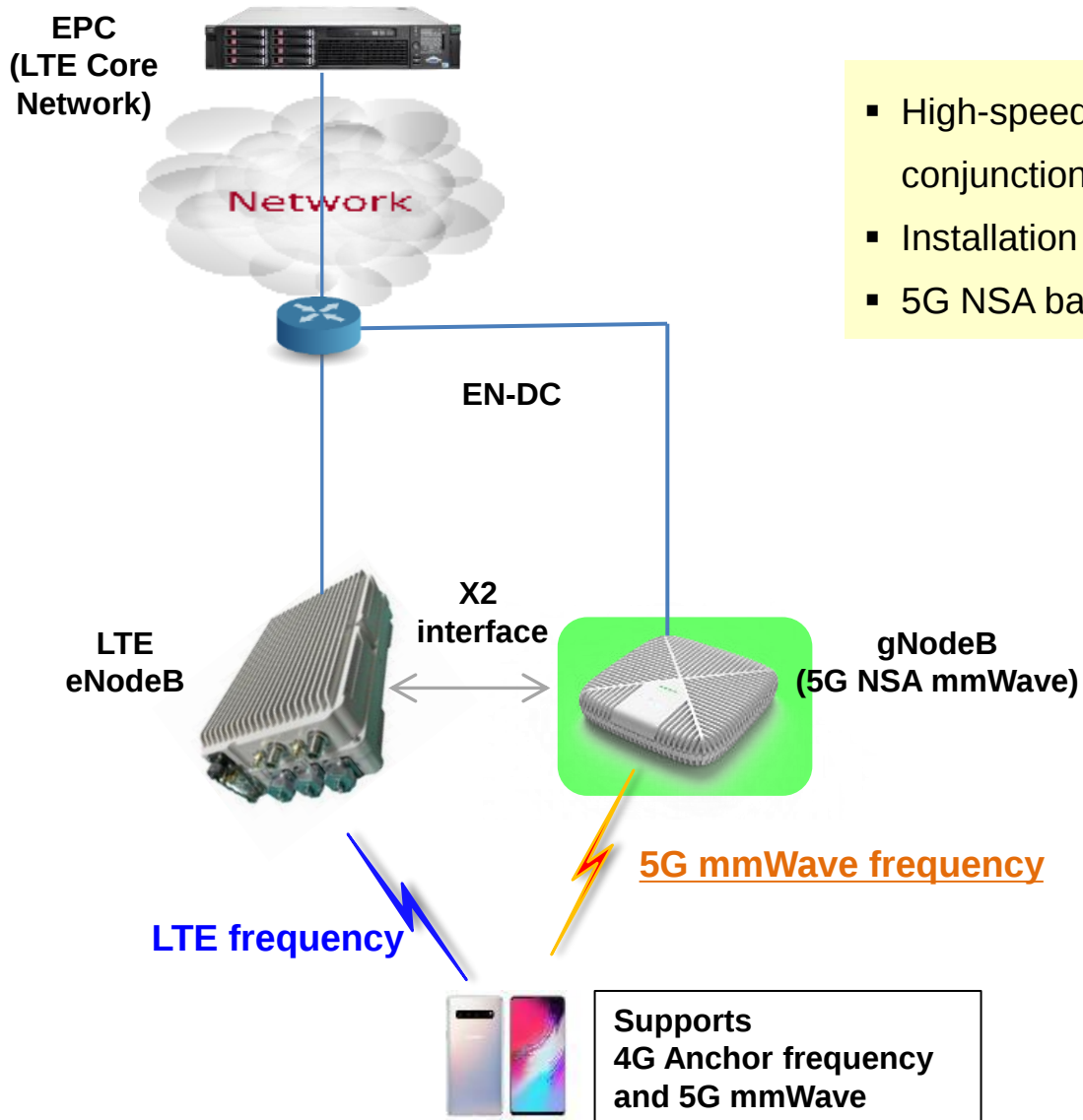


ITEM	Specification	Remark
Frequency (Band)	28GHz (n257) : 26.5~29.5GHz	
Maximum Tx Power	EIRP 50dBm (64QAM)	
Bandwidth	4*100MHz	HW supports up to 800MHz (2*400MHz or 8*100MHz)
Modulation	QPSK/16QAM/64QAM	
Antenna	128T/128R	DL: 2 layer, UL: 1 layer
Backhaul	10Gbps SFP+	802.3 10GBase-X
Power	AC adaptor : AC 100~240V, 50/60Hz DC 12V	Using AC/DC adaptor
Power Consumption	<75W	
Size (mm)	275(W) x 275(D) x 50(H)	
Weight	3.5 Kg	
Temperature	-5 ~ +40°C	
Installation	Wall Mount	

- Standard : 3GPP Release 16
- Core Network that supports SA mode
- Support Protocol : N1, N2, N3, N4, N6, N8, N11, N12, N13
- Node : AMF, SMF, UPF, AUSF, UDM
- Support 300 to 100K UEs

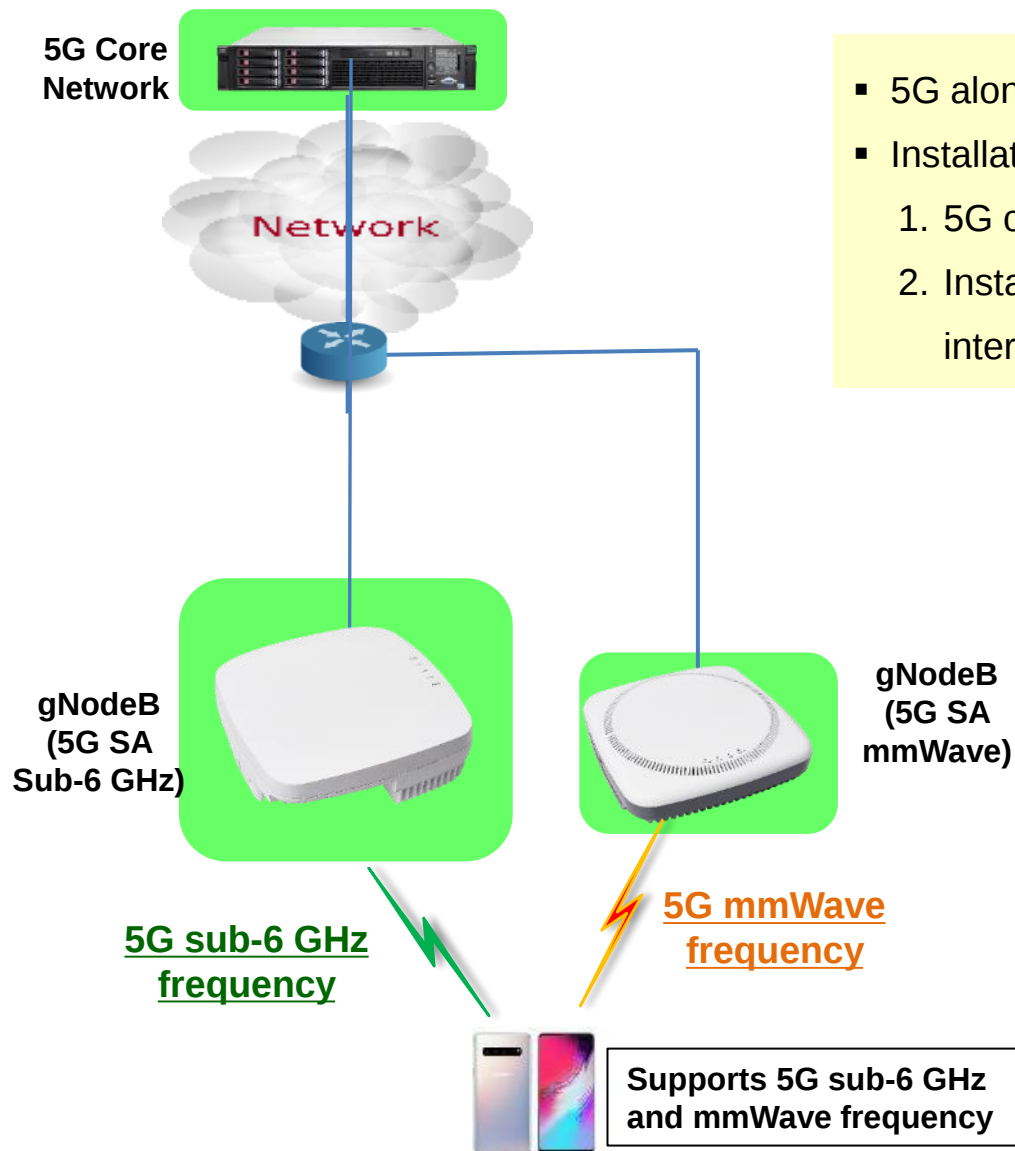


Configuration Parameter	Value	Comments
TDD Config	DDSUU	
MIMO	DL/UL 2 layers	
Modulation	DL/UL max 256QAM	
Bandwidth	100MHz	
Lab test Target (considering overhead)	DL 500Mbps UL 400Mbps	
Field Test Result	1UE DDDSU DL 700 Mbps, UL 160 Mbps DDSUU DL 520 Mbps, UL 250 Mbps 2UE FTP DL : 500Mbps iperf TCP UL : 370 Mbps 3UE FTP DL : 490Mbps iperf TCP UL : 350 Mbps	



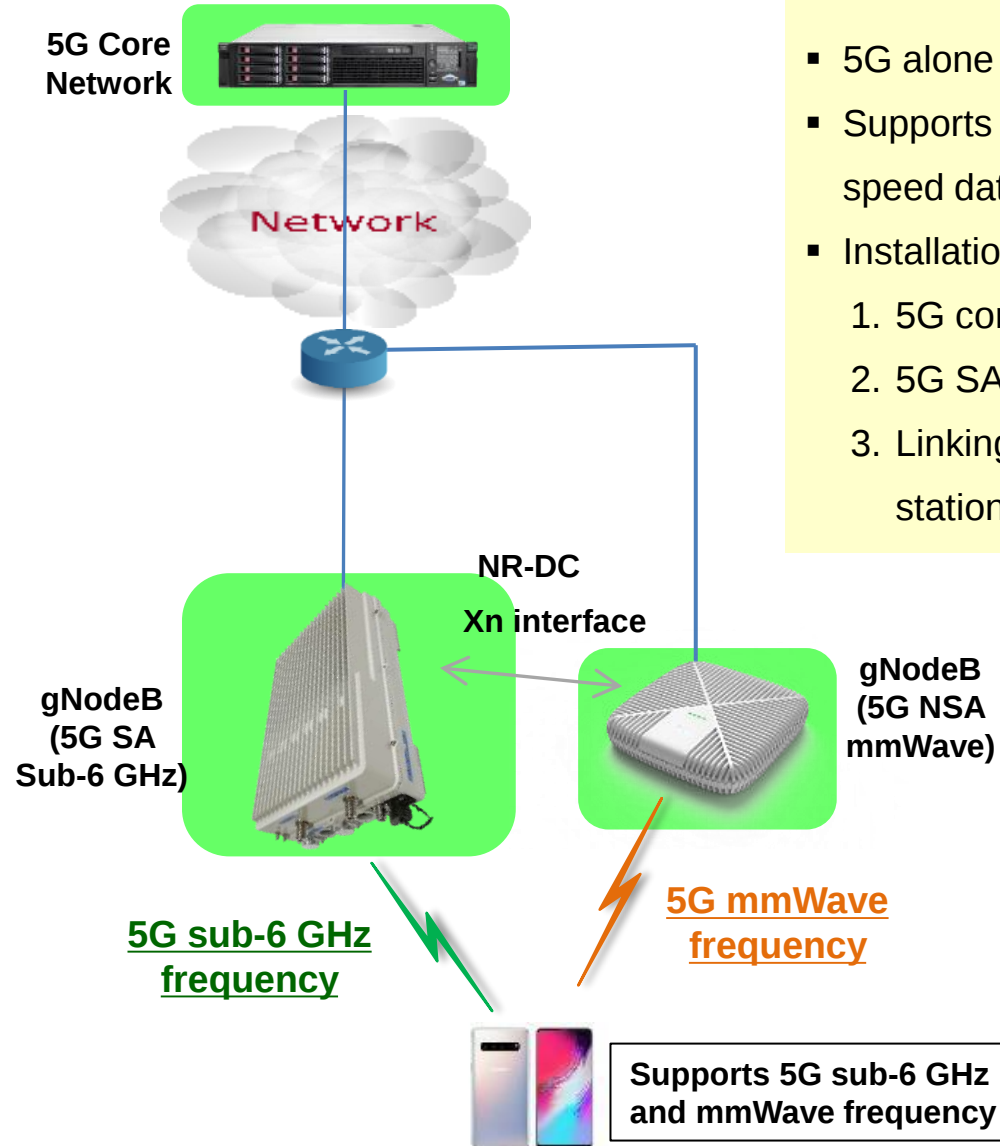
- High-speed data communication in the 5G mmWave band in conjunction with the existing LTE system
- Installation procedure: Add 5G NSA base station only
- 5G NSA base station can be SW upgraded to SA mode later

- SA: Stand Alone
- NSA: Non Stand Alone
- EN-DC: E-UTRAN NR Dual Connectivity
- NR-DC: NR-NR Dual Connectivity



- 5G alone network without interworking with the existing LTE system
- Installation procedure
 1. 5G core network installation
 2. Installation of SA base station supporting sub-6 GHz and 28GHz interworking with 5G core network

- SA: Stand Alone
- NSA: Non Stand Alone
- EN-DC: E-UTRAN NR Dual Connectivity
- NR-DC: NR-NR Dual Connectivity

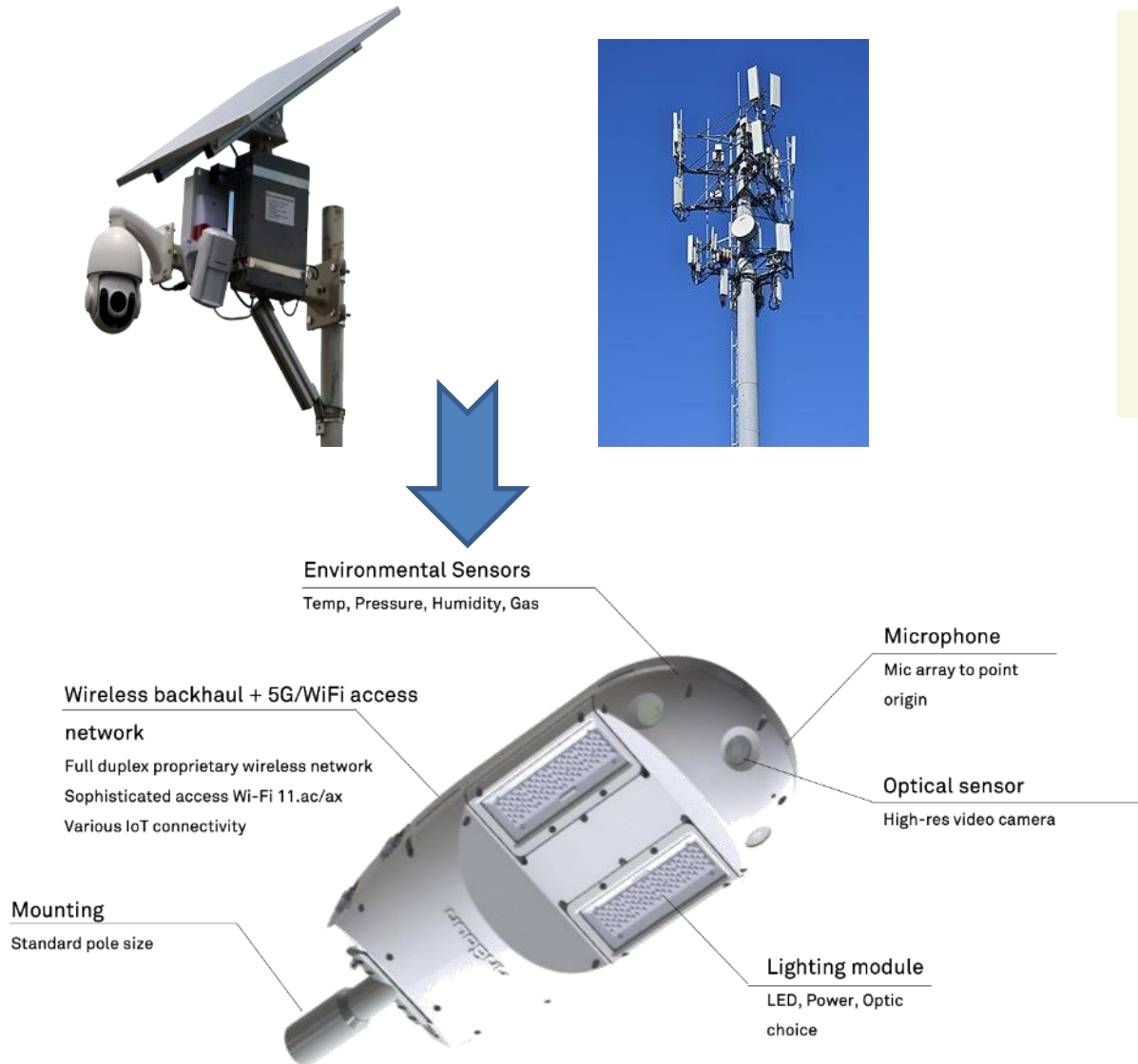


- 5G alone network without interworking with the existing LTE system
- Supports wide coverage with 5G sub-6 GHz band, and realizes high-speed data communication with 5G mmWave band
- Installation procedure
 1. 5G core network installation
 2. 5G SA sub-6 GHz base station installation interworking with 5G core
 3. Linking 5G NSA mmWave base station with 5G sub-6 GHz base station and 5G core network

- SA: Stand Alone
- NSA: Non Stand Alone
- EN-DC: E-UTRAN NR Dual Connectivity
- NR-DC: NR-NR Dual Connectivity

❖ 5G small cell inside Smart Light

- 5G Small cell installed inside Smart Light head → Provide full 5G connectivity at Smart City
- 5G capacity increase
- Low power consumption (Green Energy)
- Trial installation at 7 cities in Latin America on 1Q23

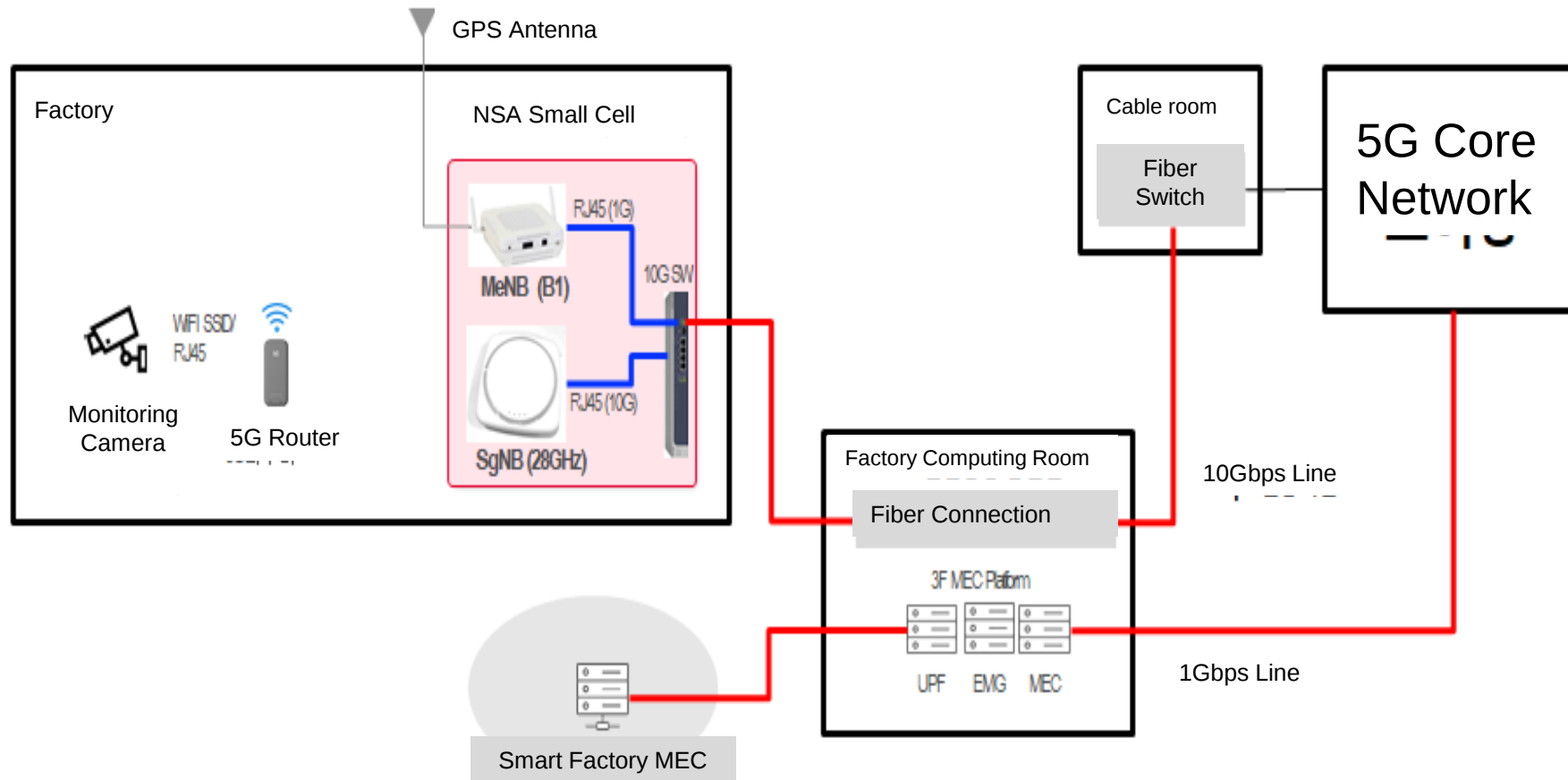


5G NR sub-6GHz



5G NR mmWave

Smart Factory Use Case



5G Small Cell Specifications (3GPP Release 15 Products) **mjlink.**

5G Capability	mmWave	Sub-6 GHz
Standard Support	3GPP 5G-NR Rel-15	3GPP 5G-NR Rel-15
Duplexing mode	TDD	TDD
Peak throughput	DL: 3.2 Gbps, UL: 1.6 Gbps	DL: 1.1 Gbps, UL: 0.84 Gbps
Max. Modulation	64 QAM	DL: 256 QAM, UL: 64 QAM
Component carrier BW	100 MHz	10, 20, 30, 40, 60, 80, 90, 100 MHz
Max. Bandwidth (OBW)	DL: 400 MHz (2L), UL: 400 MHz (1L)	DL: 100 MHz (2L), UL: 100 MHz (2L)
Instantaneous BW (IBW)	800 MHz	100 MHz
Sub-carrier spacing	120 kHz	30 kHz
MIMO layers	DL: 2, UL: 1	DL:2, UL:2
DL/UL MU-MIMO	DL: 2L to 1UE or 1L to 2UEs, UL: 1L to 2UE	DL/UL: 2L to 1UE or 1L to 2UEs
Antennas (Tx/Rx)	Up to 128Tx 128Rx	2Tx 2Rx
TTI duration	0.125ms	0.5ms
# Users/TTI	DL/UL: 2 users/TTI	DL/UL: 8 users/TTI
Spectrum support	26.5-29.5 GHz, 37.0-40.0 GHz (n257, n258[partial], n260, n261)	n41, n48, n77, n78, n79

5G Small Cell Specifications (3GPP Release 16 Products) **mjlink.**

5G Capability	mmWave	Sub-6 GHz
Standard Support	3GPP 5G-NR Rel-16	3GPP 5G-NR Rel-16
Duplexing mode	TDD	TDD, FDD
Peak throughput	DL: 8.11+ Gbps, UL: 8.11 Gbps	DL/UL: Upto 4.46 Gbps
Max. Modulation	64 QAM	256 QAM
Component carrier BW	100, 200 MHz	10, 20, 100 MHz
Max. Bandwidth (OBW)	DL/UL 1GHz (2L)	DL/UL: 200 MHz (4L)
Instantaneous BW (IBW)	Up to 1400 MHz	400 MHz
Sub-carrier spacing	120, 240 khz	15, 30 kHz
SU-MIMO layers	2	4
MU-MIMO layers	2	4
Antennas (Tx/Rx)	256Tx 256Rx (outdoor) 64Tx 64Rx (indoor)	Up to 4Tx 4Rx
TTI duration	0.125 ms	0.5 ms
# Users/TTI	DL/UL: 4 users/TTI	DL/UL: 8 users/TTI (TDD) 16 users/TTI (FDD)
Spectrum support	n257, n258, n259, n260, n261	n41, n48, n77, n78, n79, FDD bands
Release time	2Q 2024	4Q 2023