AWS/PCS 32T32R 320W MMU

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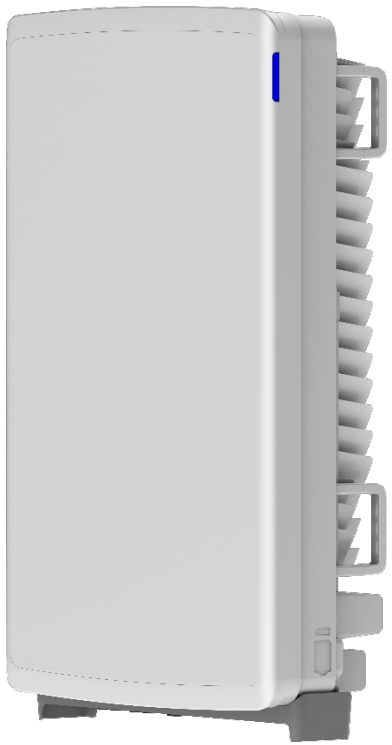
Specifications



	AWS/PCS 32T32R MMU	
Air Technology	LTE / NR	
Band	B25, n25 (PCS)	B66, n66 (AWS)
Frequency	DL: 1930 – 1995 MHz, UL: 1850 – 1915 MHz	DL: 2110 – 2200 MHz , UL: 1710 – 1780 MHz
IBW	65 MHz	DL 90 MHz, UL 70 MHz
OBW	30 MHz	60 MHz
Carrier Bandwidth	LTE: 5/10/15/20 MHz, NR: 5/10/15/20/25/30/40 MHz	
# of Carriers	Max 3 CC	Max 5 CC
Total # of Carriers	Max 6 CC (CBW ≥ 30 MHz: max 1 CC)	
MIMO Capacity	DL 8L, UL 8Rx	
RF Chain	32T32R	
Antenna Configuration	2V16H with 128 AE (4 x 1 sub-array)	
Beam gain	LTE (Common / UE beam) 16.5 dBi / 19.5 dBi NR (Common / UE beam) 16.5 dBi / 23.7 dBi	LTE (Common / UE beam) 17.0 dBi / 20.0 dBi NR (Common / UE beam) 17.0 dBi / 24.3 dBi
Conductive Power	320 W (sharable between AWS & PCS)	
Spectrum Analyzer	TX/RX support	
RX Sensitivity	LTE: Typical -104 dBm @1Rx (15 kHz, 25 RBs, room temp), -103.5 dBm (all temp) NR: Typical -103.8 dBm @1Rx (15 kHz, 25 RBs, room temp), -103.3 dBm (all temp)	
Modulation	DL 256 QAM support (DL 1024QAM with 1~2 dB power back-off)	
Function Split	DL/UL option 7-2x (ULPI support : 26B)	
Input Power	-48 VDC (-42 ~ -58 VDC)**	
Power Consumption	Typ. 1,688 W @100% load, room temp. Typ. 1,793 W @100% load, all temp.	
Size (WHD)	25.50 x 38.98 x 8.46 inch (647.6 x 990 x 215 mm)	
Volume	137.85 L	
Weight	127.2 lb (57.7 kg)	
Operating Temperature	-40℃ (-40℉) ~ 55℃ (131℉) (w/o solar load)	
Cooling	Natural convection	
Unwanted Emission	3GPP 36.104, 38.104	3GPP 36.104, 38.104
	FCC CFR 47 24.238	FCC 47 CFR 27.53 h)
	-	[BAS]-35 dBm/100 kHz@2109.45 MHz per port
Optic Interface	25 Gbps x 4 port (15/30km Bi-di or 15km tunable DWDM Duplex)	
Mounting Options	Pole, wall, tower	
NB-IoT	4 IB	
External Alarm	4RX	
Fronthaul Interface	eCPRI	
Compression	BFPC 9bit	

* HW ready
** power booster is required (not supplied by Samsung)

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AWS/PCS 32T32R 320W MMU

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Conducted Output Power Configuration

- Max. 6 CC: up to 3 CC for PCS and up to 5 CC for AWS

Carrier	Carrier Configuration (MHz)						Max. Conducted Power per Carrier (W)						Total Power (W)
1CC	5	-	-	-	-	-	80.0	-	-	-	-	-	80
	10	-	-	-	-	-	160.0	-	-	-	-	-	160
	15	-	-	-	-	-	240.0	-	-	-	-	-	240
	20	-	-	-	-	-	320.0	-	-	-	-	-	320
2CC	5	10	-	-	-	-	80.0	160.0	-	-	-	-	240
	10	40	-	-	-	-	64.0	256.0	-	-	-	-	320
	20	20	-	-	-	-	160.0	160.0	-	-	-	-	320
	20	40	-	-	-	-	106.7	213.3	-	-	-	-	320
3CC	5	5	5	-	-	-	80.0	80.0	80.0	-	-	-	240
	10	20	20	-	-	-	64.0	128.0	128.0	-	-	-	320
	15	20	20	-	-	-	87.3	116.4	116.4	-	-	-	320
	20	20	20	-	-	-	106.7	106.7	106.7	-	-	-	320
4CC	5	5	20	30	-	-	26.7	26.7	106.7	160.0	-	-	320
	10	10	10	30	-	-	53.3	53.3	53.3	160.0	-	-	320
	10	10	20	20	-	-	53.3	53.3	106.7	106.7	-	-	320
5CC	5	5	10	10	20	-	32.0	32.0	64.0	64.0	128.0	-	320
	10	10	10	10	20	-	53.3	53.3	53.3	53.3	106.7	-	320
6CC	5	10	10	15	20	30	17.8	35.6	35.6	53.3	71.1	106.7	320

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AWS/PCS 32T32R 320W MMU

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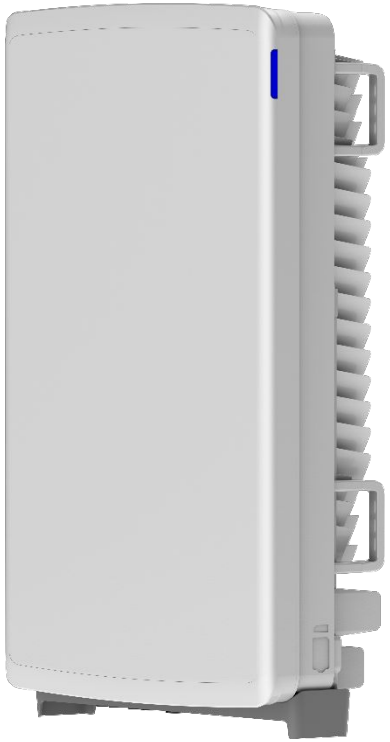
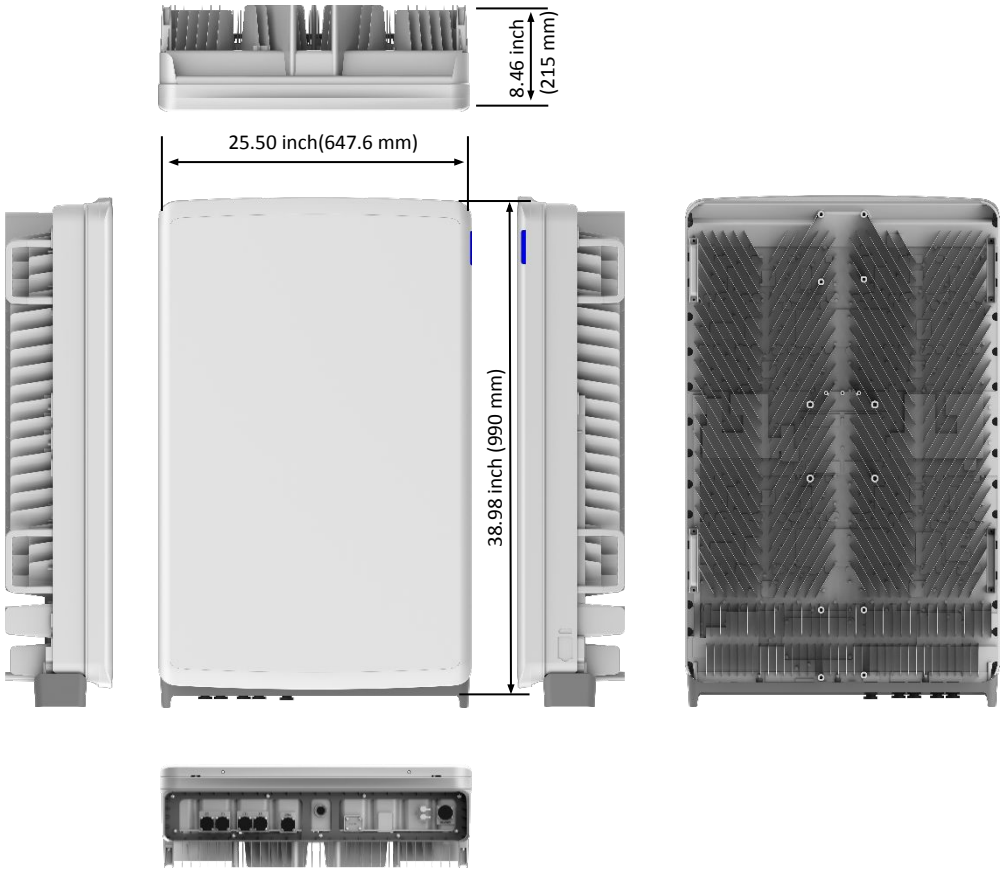
Exterior

Size (WxHxD)	25.50 x 38.98 x 8.46 inch (647.6 x 990 x 215 mm)
Volume	137.85L
Weight	127.2 lb (57.7kg)





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AWS/PCS 32T32R 320W MMU

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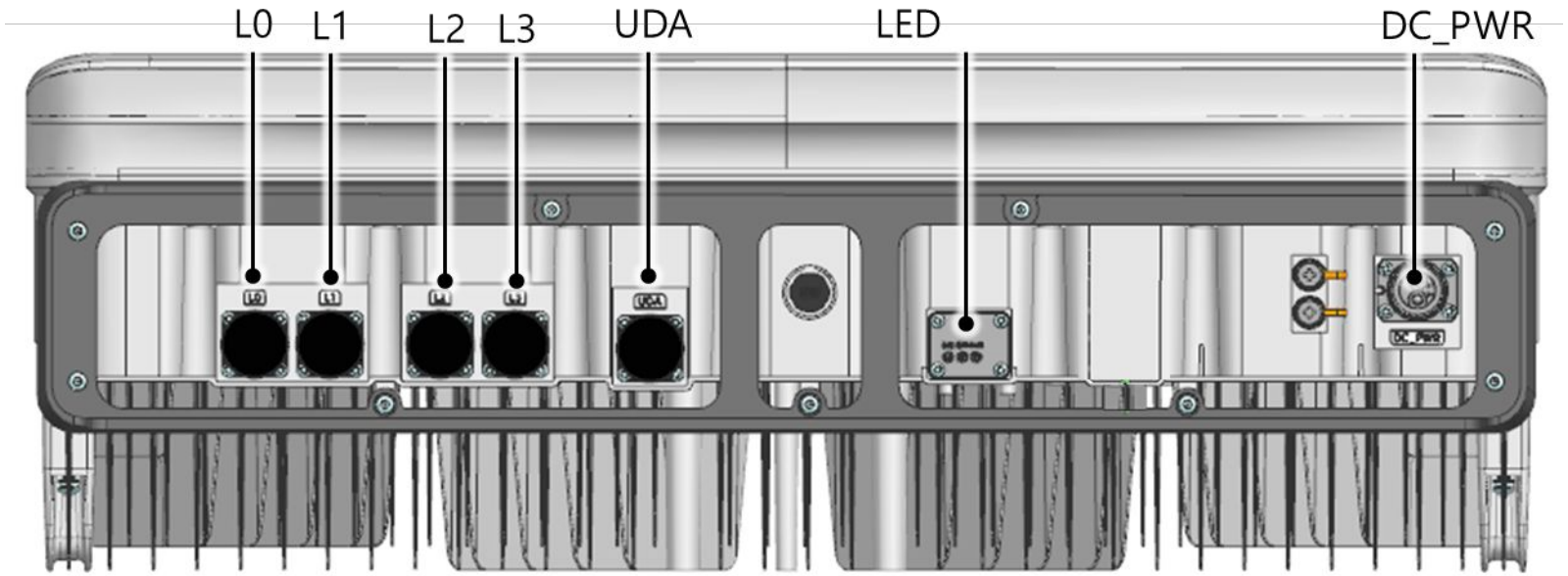
Interface



I/O Name	Interface	Connector Type	Port #
L0, L1, L2, L3	25 Gbps eCPRI	SFP28 (inner) PDLC, Push-pull type (outer)	4 Port
UDA	Open/Close (4 RX alarm)	RJ45 (inner) PDLC, Push-pull type (outer)	1 Port
SYS/OPT/PWR	LED	-	-
DC_PWR	-48 VDC	2 pin (inner) Push-pull type (outer)	1 Port

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AWS/PCS 32T32R 320W MMU

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Antenna & Beam (1/2)

Feature			Specifications	
			PCS	AWS
Frequency			DL: 1,930 ~ 1,995 / UL: 1,850 ~ 1,915 MHz	DL: 2,110 ~ 2,200 / UL: 1,710 ~ 1,780 MHz
Antenna Configuration			32T32R (2V16H)	
Polarization			±45° dual-polarized	
Port Impedance			50 Ω	
Antenna VSWR			< 1.5:1	
Antenna Element Spacing (electrical length)			Horizontal 0.5 λ @1,962.5 MHz / 0.48 λ @1,882.5 MHz Vertical 0.74 λ @1,962.5 MHz / 0.71 λ @1,882.5 MHz	Horizontal 0.55 λ @2,155 MHz / 0.44 λ @1,745 MHz Vertical 0.81 λ @2,155 MHz / 0.66 λ @1,745 MHz
Sub-array Antenna (Vertically 4-element array)	Antenna Gain of Sub-array		Typ. 11.7 dBi ± 1 dB @1,962.5 MHz Typ. 11.4 dBi ± 1 dB @1,882.5 MHz	Typ. 12.3 dBi ± 1 dB @2,115 MHz Typ. 10.7 dBi ± 1 dB @1,745 MHz
	Half Power Beamwidth	Horizontal (HBW)	Typ. 105° ± 10° @1,962.5 MHz Typ. 109° ± 10° @1,882.5 MHz	Typ. 96° ± 10° @2,115 MHz Typ. 118° ± 10° @1,745 MHz
		Vertical (VBW)	Typ. 17° ± 2° @1,962.5 MHz Typ. 18° ± 2° @1,882.5 MHz	Typ. 15° ± 2° @2,115 MHz Typ. 19° ± 2° @1,745 MHz
	Fixed e-tilt		3° (down tilt)	
Antenna Gain of Column			Typ. 14.7 dBi ± 1 dB @1,962.5 MHz Typ. 14.4 dBi ± 1 dB @1,882.5 MHz	Typ. 15.3 dBi ± 1 dB @2,115 MHz Typ. 13.7 dBi ± 1 dB @1,745 MHz
Cross Polarization Ratio (CPR)		0°	> 20 dB	
		±60°	> 10 dB	

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AWS/PCS 32T32R 320W MMU

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Antenna & Beam (2/2)

Feature		Specification	
		PCS	AWS
Common Beam	Antenna Gain	16.5dBi ± 2.2dB @ +3° tilt 16.4dBi ± 2.2dB @ 0° tilt 15.4dBi ± 2.2dB @ +12° tilt	17.0dBi ± 2.2dB @ +3° tilt 16.9dBi ± 2.2dB @ 0° tilt 15.9dBi ± 2.2dB @ +12° tilt
	Half Power Horizontal BW (HBW) for wide beam	65° ± 7°	
	Half Power Vertical BW (VBW) for wide beam	8.5° ± 1°	7.7° ± 1°
	E-Tilt Range	0° ~ +12° Vertical (+ degree refers to down tilt) (E-tilt angle of each band can be independently adjusted and the max delta of e-tilt between bands is under checking.)	
	Front-to-Back Ratio (FBR) from 150˚ to 210˚	> 25 dB	
	Side Lobe Suppression within 20° above main beam	> 12 dB @ E-Tilt 0°~3° > 10 dB @ E-Tilt 4°~7° > 9 dB @ E-Tilt 8°~12°	
User Specific Beam	Antenna Gain	23.7 dBi ± 2.2dB for Smallest beam @Boresight (Azimuth 0°, Elevation 3°)	24.3 dBi ± 2.2dB for Smallest beam @Boresight (Azimuth 0°, Elevation 3°)
	Half Power Horizontal BW (HBW)	12.5° ± 1° @Smallest Beam	12.0° ± 1° @Smallest Beam
	Half Power Vertical BW (VBW)	8.5° ± 1° @Smallest Beam	7.7° ± 1° @Smallest Beam

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AWS/PCS 32T32R 320W MMU

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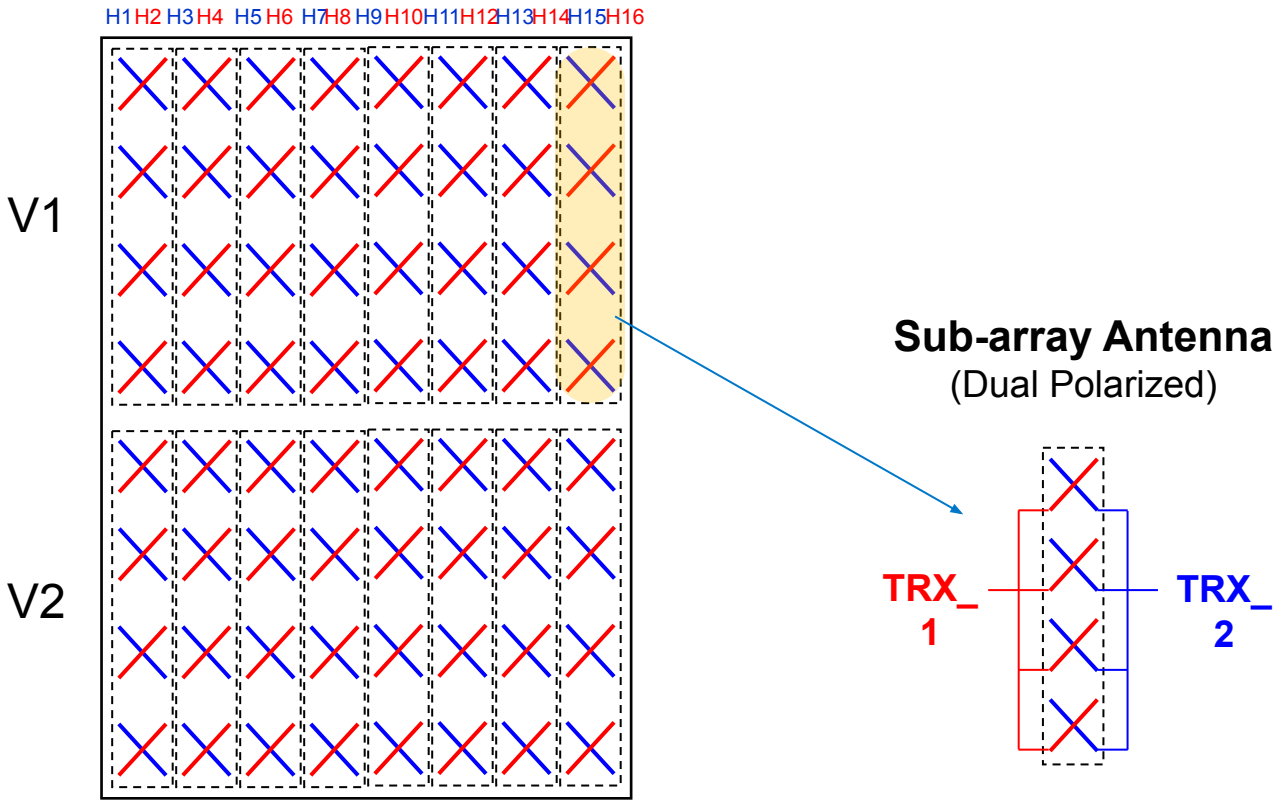
2V16H, 4 x 1 sub-array antenna, 128 Antenna Elements



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[FDD MMU] CSI-RS Configuration

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Parameters

Parameter	Description	Range	Default
dl-codebook-configuration (container)			
dl-codebook-nr-antenna-ports	This leaf is used for indication of antenna configuration(NrOfPort,N1,N2) of DL codebook for PMI feedback.	dl-codebook-nr-antenna-ports-p2 dl-codebook-nr-antenna-ports-p4-two-one dl-codebook-nr-antenna-ports-p8-four-one dl-codebook-nr-antenna-ports-p16-four-two dl-codebook-nr-antenna-ports-p32-four-four dl-codebook-nr-antenna-ports-p32-eight-two	dl-codebook-nr-antenna-ports-p4-two-one
csi-rs-config (container)			
cri-based-beamformed-csirs	This leaf is switch of CRI-based beamformed CSI-RS.	{false, true}	False
pdsch-config (container)			
csi-rs-pdsch-fdm	This leaf indicates FDM support between CSI-RS and PDSCH. It is used to utilize the radio resources efficiently, where PDSCH can be allocated to remaining REs in CSI-RS allocated symbols.	{false, true}	false
spectrum-sharing-scheduler-config			
spectrum-sharing	This leaf indicates the configuration of spectrum sharing mode.	{false, true}	false

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[FDD MMU] EIRP Control

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Dependency & Limitation

- Frequency Range: FR1 FDD only
- HW dependency: AWS/PCS 32T32R MMU only

Parameters

Parameter	Description	Range	Default
eirp-control-config			
fdd-mmu-eirp-control-enable	This leaf indicates EIRP control for FDD MMU is activated or deactivated - When “Disable”, EIRP control operation for FDD MMU is disabled. - When “Urban”, EIRP Control is operated as maximum 62.125dBm/MHz - When “Rural”, EIRP control is operated as maximum 65.125dBm/MHz. The value of this parameter will be manually set as cell creation parameter depend on Cell Planning Status	“Disable” “Urban” “Rural”	“Disable”
fdd-mmu-eirp-layer-mode	This leaf indicates EIRP Layer Power Boosting Mode - When “None”, Layer Power Compensation isn't worked - When “pmi-su”, Layer Power Compensation is worked on PMI SU transmission - When “all”, Layer Power Compensation is worked on both PMI SU & MU transmission	“None” “pmi-su” “all”	“pmi-su”
fdd-mmu-eirp-pdsch-offset	This leaf indicates PDSCH Offset of EIRP control for FDD MMU	-40 ~ 40 (unit : 0.1dB)	0

Counter: None

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[FDD MMU] E-Tilt Config.

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Level	Hierarchy	Parameter Name	Range
cell	managed-element/gnb-du-function/gutran-du-cell/gutran-du-cell-entries[cell-identity=1]/etilt-configuration	hpbw-horizontal	hpbw-horizontal-20degrees(17)|hpbw-horizontal-30degrees(2)|hpbw-horizontal-45degrees(5)|hpbw-horizontal-65degrees(0)
cell	managed-element/gnb-du-function/gutran-du-cell/gutran-du-cell-entries[cell-identity=1]/etilt-configuration	hpbw-vertical	hpbw-vertical-8degrees(8)
cell	managed-element/gnb-du-function/gutran-du-cell/gutran-du-cell-entries[cell-identity=1]/etilt-configuration	etilt-angle	0-12

Level	Hierarchy	Parameter Name	Range
cell	managed-element/gnb-du-function/gutran-du-cell/gutran-du-cell-entries[cell-identity=1]/dl-codebook-configuration	dl-codebook-nr-antenna-ports	dl-codebook-nr-antenna-ports-p2(0)|dl-codebook-nr-antenna-ports-p4-two-one(1)|dl-codebook-nr-antenna-ports-p8-four-one(3)|dl-codebook-nr-antenna-ports-p16-four-two(6)|dl-codebook-nr-antenna-ports-p32-four-four(11)|dl-codebook-nr-antenna-ports-p32-eight-two(12)

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AWS/PCS 32T32R 320W MMU

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Fronthaul Capacity

Carrier Configuration (per Radio)	Option	FH capacity		# ports
	LLS	DL	UL	
1. MMU HW maximum capacity **FDD LTE/NR 90MHz, 6C (DSS 20MHz, 1C)**	7-2x (8Rx)	27.32 Gbps	20.23 Gbps	2 port
	ULPI	27.51 Gbps	20.02 Gbps	2 port
2. MMU HW maximum capacity **FDD LTE/NR 90MHz, 6C (No DSS)**	7-2x (8Rx)	24.69 Gbps	16.89 Gbps	1 port
	ULPI	24.87 Gbps	17.01 Gbps	1 port
3. VZ maximum spectrum holding for AWS+PCS **FDD LTE/NR 60MHz, 4C (DSS 20MHz, 1C)**	7-2x (8Rx)	19.10 Gbps	14.60 Gbps	1 port
	ULPI	19.22 Gbps	14.35 Gbps	1 port

- PRACH shaping : transmit PRACH U-plane after transmitting PUxCH U-plane

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n66 FCC Requirement for Co-location with Satellite

- FCC requirement: FCC 47 CFR Part 27. 1134 (e) for U.S. Earth Station facility operating in 2200-2290 MHz
- Verizon needs to confirm that OOBE requirement of 2110-2200MHz is not applicable in 2200-2290 MHz based on FCC 47 CFR Part 27. 1134 (e)(2)
- Proposed radio doesn't consider OOBE requirement FCC 47 CFR Part 27. 1134 (e)(1)(i).

  However, proposed radio applied FCC 47 CFR part 27.53(h) of 43 + 10*log(P)

FCC Part 27.1134 (e)

(e) *Protection of Federal operations in the 2200-2290 MHz band*—(1) *Default emission limits.* Except as provided in paragraph (e)(2) of this section, the following default out-of-band emissions limits shall apply for AWS-4 operations in the 2180-2200 MHz band.
(i) For these AWS-4 operations, the power of any emissions on all frequencies between 2200 and 2290 MHz shall not exceed an EIRP of −100.6 dBW/4 kHz.
(ii) No AWS-4 base station operating in the 2180-2200 MHz band shall be located less than 820 meters from a U.S. Earth Station facility operating in the 2200-2290 MHz band.
(2) ***Agreements between AWS-4 operators and Federal government entities.*** **The out-of-band emissions limits in paragraph (e)(1) of this section may be modified by the private contractual agreement of licensees of AWS-4 operating authority and Federal government entities operating in the 2200-2290 MHz band.** Such agreement shall be transmitted to the Commission by the National Telecommunications and Information Administration (NTIA) of the U.S. Department of Commerce. A licensee of AWS-4 operating authority who is a party to such an agreement must maintain a copy of the agreement in its station files and disclose it, upon request, to prospective AWS-4 assignees, transferees, or spectrum lessees, to Federal operators, and to the Commission.

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