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5G Redcap Module: ⁵⁶ A Key Advancement to Boost 5G Deployment



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Agenda



RedCap's Mission

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3 Fibocom RedCap Module Portfolio

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RedCap's Mission

01

RedCap's Mission

What's RedCap: Reduced capability of 5G, while offer additional capabilities compared to LTE

In 5G NR Release 17, 3GPP introduced a new tier of reduced capability (RedCap) devices, also known as NR-Light. It is a new device platform that bridges the capability and complexity gap between the extremes in 5G today with an optimized design for mid-tier use cases.



Data Rates

The target peak rate of eMBB is up to 20 Gbps in downlink and 10 Gbps in uplink, while for RedCap use cases it is up to **226 Mbps** in downlink and **121Mbps** in uplink

Latency

The target for URLLC is about 1ms, while for RedCap use cases it is <100 ms for industrial sensors and <500 ms for video surveillance.

Battery Life

The target for mMTC is 10 - 15 years, while for RedCap use cases it is a few years for industrial sensors and one to two weeks for wearables.

RedCap's Mission

RedCap (Reduced Capability) = NR light (NR lite)



Why RedCap ?



"RedCap mainly aims at the requirements of **Bandwidth, Power Consumption**, and **Cost**, which are based on the application between eMBB and LPWA."

RedCap Network Planning Public 5G SA Networks



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Application scenarios of RedCap module: Medium-high Speed Uplink

- Uplink speed of RedCap is twice as fast as Cat.4 & Cat.6
- Fully compliant with requirement of FHD video(4K@60fps)

	Uplink Requirement		Notwork	2000	
Video Resolution			Network	JGPP	MIMO
1080P@60fps	4 5~9Mbns		4G	LTE Cat.4	N/A
	4.5-30ps		4G+	LTE Cat.6	N/A
<mark>4K@60fps</mark>	20-50Mbps		5G	NR	2*2
8K@60fps	100-200Mbps			NR Light: RedCap	N/A

Network	3GPP	Uplink Technology					
		MIMO	CA	BW	Modulation	Speed	
4G	LTE Cat.4	N/A	1	20MHz	16QAM	50Mbps	
4G+	LTE Cat.6	N/A	1	20MHz	16QAM	50Mbps	
50	NR	R 2*2 1 100N		100MHz	256QAM	1.0Gbps	
эG	NR Light: RedCap	N/A	1	20MHz	256QAM	100Mbps	



5G + IPC



5G + Body-Worn Camera





5G + Vehicle

Application Scenarios of RedCap Module: 5G + Industrial Automation





Application Scenarios of RedCap Module: FWA



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Application Scenarios of RedCap Module: Personal Comsumer Devices





5G PC

5G MiFi

- Full HD Video Upload
- Low Latency
- Medium, High Speed

Application Scenarios of RedCap Module: Smart Grid



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03

FG132-GL Initial Spec





FG132-GL(Design for Global)

Basic Features

LGA Dimension: 29.0 x 32.0 x 2.4mm (Compatible Design with LTE Cat 4 Modules) M.2: 30 x 42mm 5G NR: 3GPP R17 RedCap SA operation, Sub-6 GHz SA Bands: N1/2/3/5/7/8/12/13/14/18/19/20/25/26/28/30/38/40/41/48/66/70/71/77/78 LTE Bands: B1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/30/34/38/39/40/41/42/43/48/66/71 NR-HPUE: N38/40/41/77/78 LTE-HPUE: B38/40/41/42/43

Basic Functions

Protocol: TCP/UDP/PPP/NTP/NITZ/FTP/HTTP/PING/CMUX/HTTPS/FTPS/SSL/FILE/MQTT/CoAP/LwM2M GNSS Integrated PCIe 2.0/USB 2.0/SGMII Supported Antenna: Sub-6 *2(1T2R) + GNSS *1 OS: OpenWRT ES: Nov 2023 CS: Feb 2024

FG132-NA Initial Spec





FG132-NA (Design for North America)

Basic Features

LGA Dimension: 29.0 x 32.0 x 2.4mm (Compatible Design with LTE Cat 4 Modules) M.2: 30 x 42mm 5G NR: 3GPP R17 RedCap SA operation, Sub-6 GHz SA Bands: N2/5/7/12/13/14/25/26/30/38/41/48/66/70/71/77/78 LTE Bands: B2/4/5/7/12/13/14/17/25/26/30/38/41/42/43/48/66/71 NR-HPUE: N38/41/77/78 LTE-HPUE: B38/41/42/43

Basic Functions

Protocol: TCP/UDP/PPP/NTP/NITZ/FTP/HTTP/PING/CMUX/HTTPS/FTPS/SSL/FILE/MQTT/CoAP/LwM2M GNSS Integrated PCIe 2.0/USB 2.0/SGMII Supported Antenna: Sub-6 *2(1T2R) + GNSS *1 OS: OpenWRT

FG131-NA

Basic Features

Fibocon FG131-XXX

37 mm

Dimension: 37.0 x 39.5 x 2.3mm 5G NR: 3GPP R17 RedCap SA operation, Sub-6 GHz SA Bands: N2/5/7/12/13/14/25/26/30/38/41/48/66/70/71/77/78 LTE Bands: B2/4/5/7/12/13/14/17/25/26/30/38/41/42/43/48/66/71

Basic Functions

GNSS integrated PCIe 2.0/USB 2.0 VoNR/VoLTE supported Antenna: Sub-6 *2(1T2R) + GNSS *1 OS: OpenWRT

ES: Nov 2023 CS: Mar 2024

Module Comparison between RedCap and Traditional 4G/5G

Specification		Qualcomm	4G chipsets	Qualcomm 5G MBB chipset	Qualcomm 5G Redcap chipset	
		9X07(Cat.4) SDX12(Cat.6)		SDX62	SDX35	
Chipset Name		MDM9x07	SDX12	SDX62	SDX35	
3GPP Version		R9	R12	R16	R17	
Chip Process		28nm	14nm	4nm	4nm	
Built in AP		Cortex-A7@1.3GHz, Single-Core	Cortex-A7@1.3GHz, Single-Core	Cortex-A7@1.7GHz, Single-Core	Cortex-A7@1.7GHz, Single-Core	
LTE	DL	2x2 MIMO/1CC/2L, 64QAM, Cat.4 150Mbps	4x4 MIMO/2CC, 64QAM, Cat.6 300Mbps	4x4 MIMO/5CC/16L/Cat.19	2x2 MIMO/1CC/2L, 256QAM 195Mbps	
	UL	SISO/1CC/1L, 16QAM 50Mbps	1CC/SISO/1L,16QAM 50Mbps	2CC/SISO/2L/Cat.18	SISO/1CC/1L, 256QAM 105Mbps	
	CA	Not support	Not support	DL 2CA	no CA	
NR Sub-6GHz	DL	Not support	Not support	Up to 120MHz, 2.5Gbps	20MHz/2x2 MIMO/1CC/2L, 256QAM 226Mbps	
	UL	Not support	Not support	100MHz/2x2 MIMO/1CC/2L, 256QAM 900Mbps	20MHz/SISO/1CC/1L, 256QAM 121Mbps	
NSA (LTE+Sub 6)		Not support	Not support	Support	Not support	
	PCle	x1	x1	X1	X1	
Main Interface	USB	x1	x1	X1	X1	
	МІІ	Not support	Not support	Not support	SGMII(2.5Gbps) x 1	
Network Slicing		Not support	Not support	Support	Support	
5G LAN		Not support	Not support	Support	Support	
Software Open OS		УОСТО	УОСТО	YOCTO	OpenWRT	

Application Architecture of RedCap Module



FWA Architecture of RedCap Module



Specification					
Celluar	Applicable Network	5G NR SA/LTE			
Wi-Fi	2.4 GHz	IEEE 802.11b/g/n/ax, 2*2			
	5 GHz	IEEE 802.11a/n/ac/ax, 2*2			
	Transmission Rate	DBDC 2*2-40MHz@2.4GHz + 2*2-160MHz@5/6GHz Up to 3.6GHz with 4096QAM (688Mbps + 2882Mbps)			
Ethernet	WAN/LAN	1.25GE*1			
Key Features	1, Highly integrated with single WI-Fi chip. 2, Qualcomm recommended design.				

FWA Solution

No.	Product Type	Solution Configuration					Open OS	Promotion	
		Module	External AP	Wi-Fi Chip	PHY Chip	Others	Solution Capabilities	System	Method
1	CPE		N/A	WCN6856/ QCA6174	QEP8111/ RTL8211H	N/A	WiFi6: AX3600 Dual-Band(2+2) WiFi5 Dual-Band but No DBDC	OpenWRT	Demo + Reference Design
3	MiFi	FG131	N/A	QCA6174	N/A	N/A	WiFi5 Dual-Band but No DBDC	OpenWRT	Demo + Reference Design
4	MiFi	Series N/A		WCN6856	N/A	N/A	WiFi6: AX3600 Dual-Band(2+2)	OpenWRT	Demo + Reference Design
5	ODU		N/A	N/A	QEP8111/ RTL8211H	N/A	TBD	OpenWRT	Demo + Reference Design

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