

HFR Company Profile

June 2020



Create the Resonant Networking

Networking should include not only providing connectivity tools, but also providing the necessary services. Networking, like nature, will be always staying next to us.

Company in Brief

Company	HFR, Inc.
Established	Jan. 5 th , 2000
Business Type	ICT Equipment and Service Platform Builder
Main Products	Mobile and Broadband Networks
Revenue	\$130.6 mil (2019)
Capital	\$5.0 mil
IPO	2018 (KOSDAQ 230240)
Homepage	www.hfrnet.com

Subsidiary and Affiliates

Company	Main Business	Location	Shares
allRadio	Telecom equipment maker	Korea	100%
Zpsys	Telecom equipment maker	Korea	53.45%
nTels	ICT service platform provider	Korea	19.34%
ccWell	On-premise ICT service provider	Korea	100%
HFR Networks	Telecom equipment provider	USA	98.75%
HFR K-Access Vina	ICT equipment developer	Vietnam	100%

As of June in 2020

Business Areas

Mobile Access

4G/5G xHaul: WDM & Packet RAN Transport

Indoor & Outdoor Cellular Radio System

Broadband Access

10 Gigabit Internet

Wi-Fi Access Point

Private 5G & Services

5G SA vCORE/vRAN

Business Platform

Shareholder List

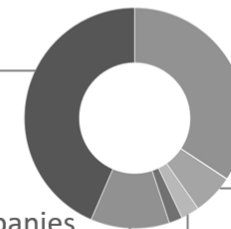
43.2 Other Individuals

34.25 Founder

5.94 Financial Investors

11.55 Other minor companies

2.69 2019 KIF-Stonebridge IT



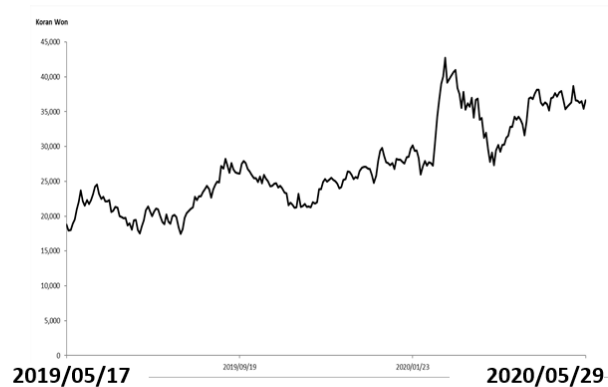
As of June in 2020

Why HFR is an Attractive Bet

Return on Investment

- Fastest growing company in 2019 KOSDAQ
- Positioned as a leading 5G company with visionary strategy
- To suffer less price impact from COVID-19

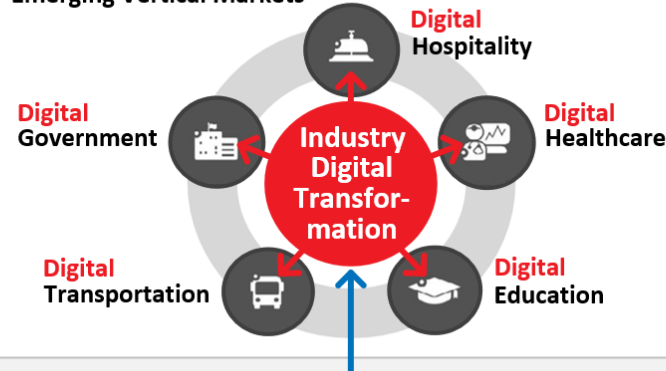
HFR Stock Price



Competitive Advantage

- **Network Agility** for automation and orchestration
- **Digital Diversity Management** for managing the explosion of diverse digital technologies
- **Global Infrastructure Enablement** to span global customers and suppliers to deliver "infrastructure everywhere"

Emerging Vertical Markets

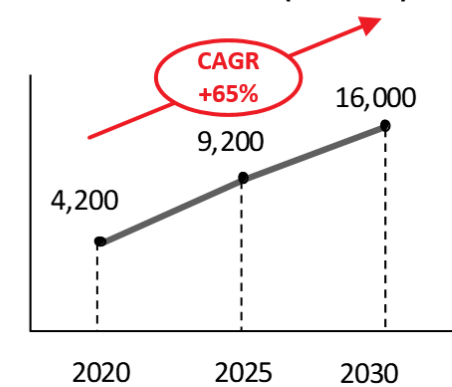


HFR's Future Digital Infrastructure

Upside Market Growth

- **Governments Support** for the recovery from COVID-19
- **5G Market Growth** for automation and orchestration
- **Global Private 5G Market** will be exponentially growing in US, Japan and Europe

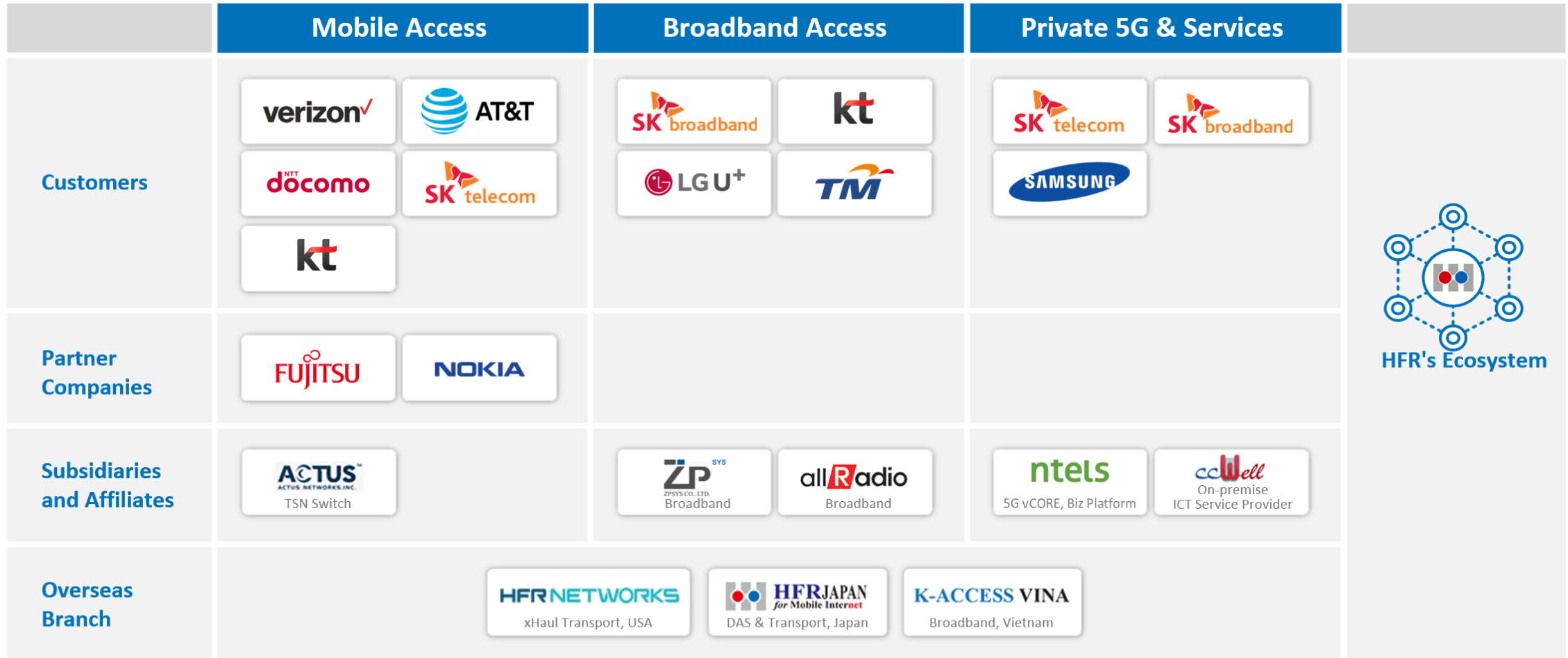
Private 5G Market (USD \$M)



Source: SNS Telecom & IT

HFR's Ecosystem

HFR and its ecosystem are vital links in an innovation value chain, creating a family of companies empowered to achieve vital advancements through their combined technical synergies.



History

Business Expansion to Global Market with Mobile and Broadband Solutions

2014: Entered the US Carrier Ethernet market for enterprise usage

2011: The world's first 4G WDM fronthaul deployment with SK Telecom

Market dominant player in 4G Mobile and Giga Broadband of Korea

2010: Acquired ZPSYS

2008: Provided ROADM product to KT

Selected as a promising and innovative start-up

Exported repeaters to the USA and Thailand

2000-2006

Cellular Coverage

2000 Start

2007-2010

Added Transport & Broadband Biz

2011-2015

Dominated Domestic Market

2016-Current
Expansion into Global Markets

2020: Acquired ntels

2019: 5G Fronthaul/Backhaul Release

- SKT deployed HFR's 5G-PON fronthaul gear
- AT&T adopted flexiHaul as xHaul transport gear
- Verizon selected HFR's packet fronthaul solution

2018: Listed on KOSDAQ

2016: Verizon deployed HFR's 4G fronthaul gear



Along with WCDMA expansion in Korea, HFR provided cellular coverage solutions based on fiber.

By acquiring technology based companies, HFR added WDM/ Packet Transport and PON/WiFi.

HFR dominated the Korean market known to be early adopters of the latest technology.

By leveraging leadership in 10G Broadband and mobile fronthaul within the Korean market, HFR aggressively continues global expansion into USA, Japan and APAC.

Accomplishments & Future Leaps

Leveraging our current leadership within the 5G mobile access and 10G broadband access markets, HFR's future growth is focused on achieving leadership within the "Private 5G" market by delivering integrated managed services on an IoT platform.

Private 5G & Services

Future Digital Infrastructure Builder

- Managed Service Provider
(On-Site Private 5G Network & Services)
- Development of Private 5G Total Solution

5G SA vCore 5G vRAN, RU Biz Platform

Broadband Access

- 10G Gigabit Internet Commercialization in Korea
- Dominant Player in Korea's Wired Access G-PON Market
- The World's 1st 2-Pair Giga Ethernet Switch Commercialization

G-PON 2-Pair Ethernet 10G-EPON XGS-PON

Mobile Access

- Packet Fronthaul (RoE, TSN) Development
- The 1st Korean Company to Enter the US Fronthaul Market
- The World's 1st C-RAN Fronthaul Commercialization

In-Building Cellular 4G WDM Fronthaul 4G/5G WDM xHaul 4G/5G Packet xHaul

HFR's Business Areas

Mobile Access

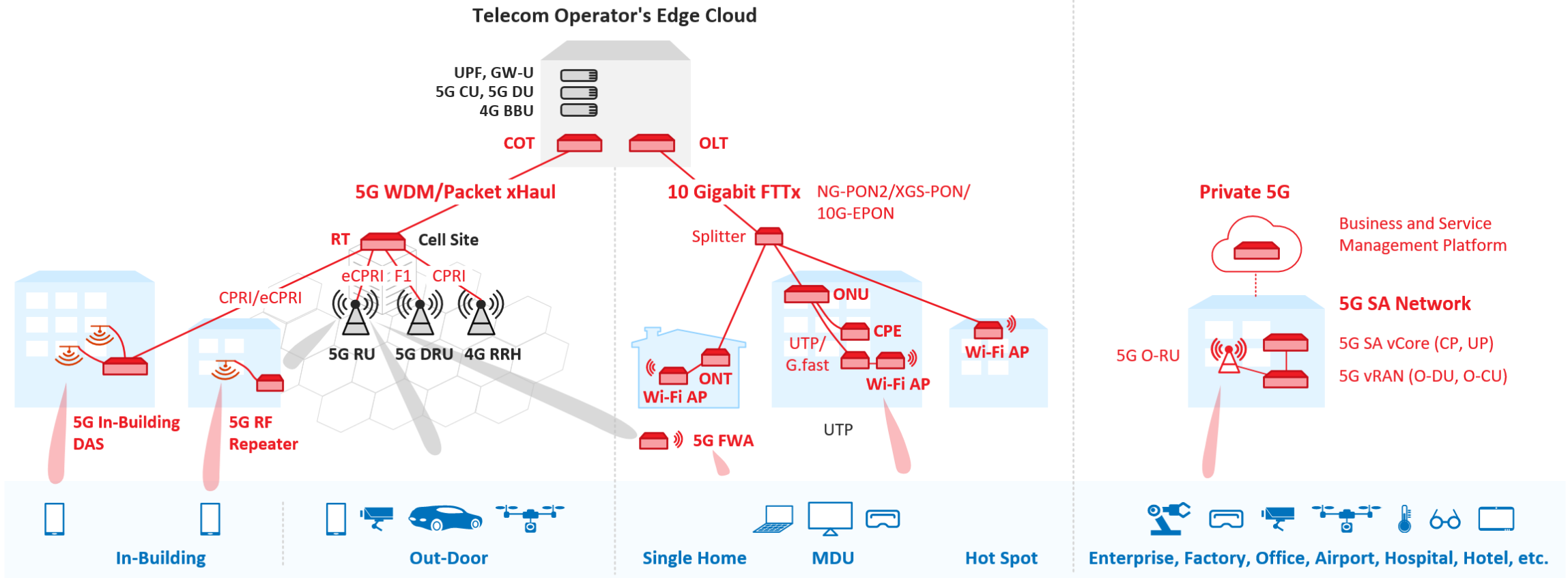
- 4G/5G xHaul (WDM & Packet RAN Transport)
- Indoor & Outdoor Cellular Radio System

Broadband Access

- 10G Gigabit Internet (FTTx)
- Wi-Fi Access Point

Private 5G & Services

- 5G SA Network (5G vCore, vRAN, RU)
- Business Platform



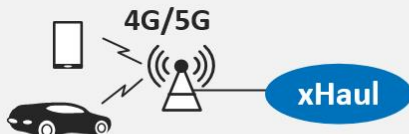
HFR offers innovative solutions in Mobile Access, Broadband Access and Private 5G.



1 Mobile Access **flexiHaul Solution**

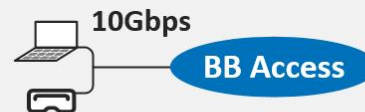
HFR provides mobile RAN transport and indoor & outdoor cellular to help operators save CAPEX/OPEX investments.

HFR delivers both WDM solution and a packet-based solution for mobile fronthaul and backhaul services with U.S., Korean and Japanese markets.



2 Broadband Access **Broadband Access Solution**

HFR provides home broadband access solutions for 1G/2.5G/5G/10G to the home. HFR is currently providing all three broadband solutions - FTTH, FTTB + LAN, and FTTB + G.fast, allowing telecom operators to deliver ultra-high speed Internet for any residential environment.



3 Private 5G & Services **my5G Solution**

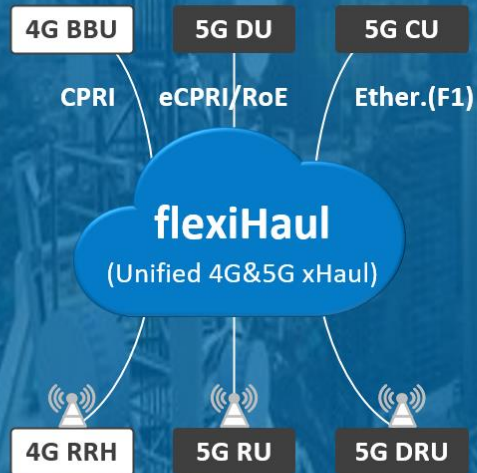
HFR is developing private network solutions for public institutes and enterprise customers for the 5G era. Our fully virtualized 5G SA end-to-end solution, includes 5G vRAN, 5G vCore and Business Platform.



flexiHaul Solution

Converged Transport of All Mobile Traffic to save Operator's CAPEX/OPEX for 4G & 5G Services

- Provides fronthaul/midhaul for 4G (CPRI) and 5G (F1, eCPRI) traffic
- Available as a WDM or packet-based solution
- RAN vendor-neutral



WDM Fronthaul Solution

- Optimize services over limited fiber assets for better economics and improved time to market
- Cost-effective, highly flexible family of scalable transport units that delivers a broad range of xHaul (fronthaul, midhaul and backhaul) services.
- Configurable as point-to-point, linear chain, point-to-multipoint, or ring network topologies and also Active to Active, Active to Passive configuration.
- WDM xHaul platform has an integrated transponder, controller and WDM filter. It offers a variety of performance, quality measurement and monitoring.

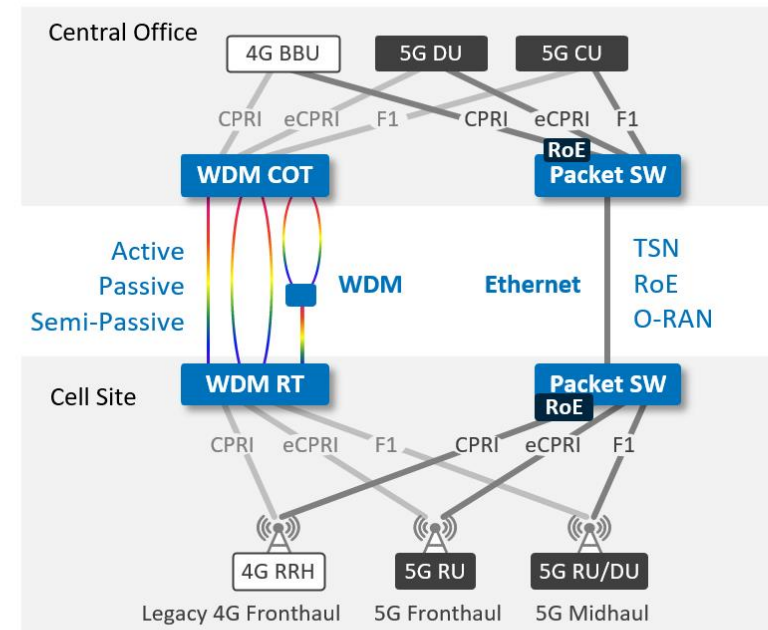
WDM Solution
CPRI + eCPRI + Ethernet
over WDM

HSN8000NA
5G-PON



Packet Fronthaul Solution

- TSN switch optimized for xHaul supports CPRI, eCPRI and Ethernet
- The network migrating into Packet Radio Access Network for the future Function Split and software centric Radio Access Network.
- HFR's packet-based fronthaul platform supports 4G / 5G centralized and cloud-based RAN architectures by leveraging next-generation Packet RAN access technology.
- Time-Sensitive Networking (TSN) aggregation and transport switch supports interfaces for CPRI, eCPRI and Ethernet services.



Packet Solution
CPRI(RoE) + eCPRI + Ethernet
over TSN Ethernet

M6424



With HFR's solution, 5G overlay is not needed on existing 4G transport networks, helping to reduce total costs and speed time to market of lucrative new 5G services

Broadband Access Solution

1G/2.5G/5G/10G to the Home

HFR is currently providing all three broadband solutions- FTTH, FTTB + LAN and FTTB + G.fast, allowing telecom operators to deliver ultra-high speed internet (1/2.5/5/10Gbps) to users for any residential environment.

HFR's Broadband Access Solution

Any Residential Environment



True Turnkey Solution

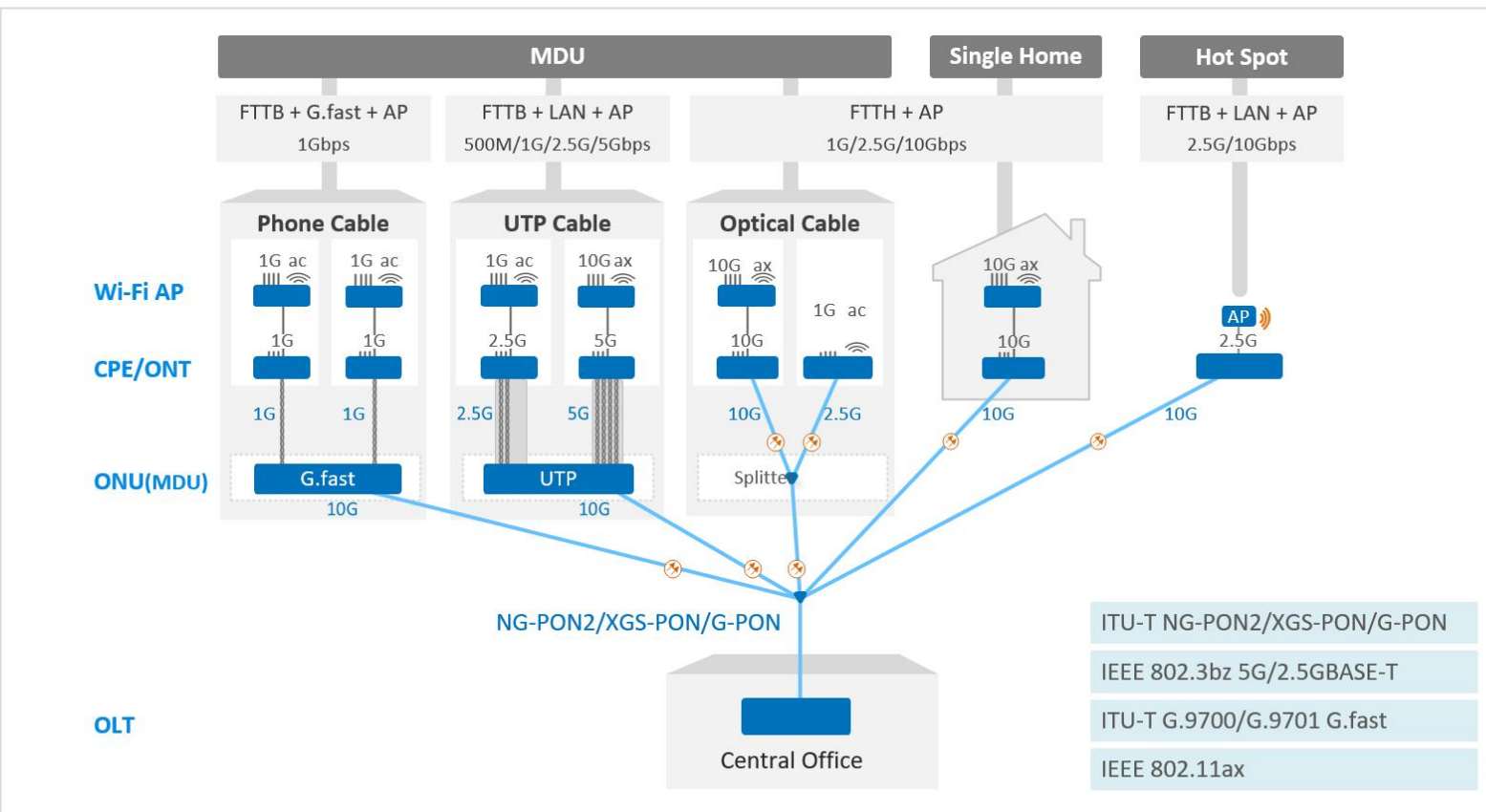
- Wi-Fi AP: 4.8Gbps
- + CPE/ONT: 1G/2.5G/5G/10Gbps
- + ONU(MDU): UTP 4-Pair/2-Pair
- + OLT: NG-PON2/XGS-PON/10G-EPON/G-PON

10 Gigabit Internet Solution: XGS-PON and 10G-EPON

- XGS-PON lead fiber access technology for delivering residential, business, and mobile backhaul services.
- HFR to provide 10 Gigabit Internet service (2.5G/5G/10G to the home) for any residential environment
- Wired terminals up to 10G service and wireless terminals for 4.8G services
- End-to-end 10 Gigabit Internet solutions from OLT to ONU, ONT, CPE, and Wi-Fi access points.
- Multi-Gigabit Ethernet and G.fast provide the optimal solution for MDU/MTU services.

Wi-Fi Access Point

- HFR is shipping an estimated 1M Wi-Fi access points to Korean operators every year.
- All of latest Wi-Fi 6 have been shipped from 2019 together with the access point controller.



my5G solution

Our End-to-End Private 5G Solution, my5G includes 5G SA vCore, O-RAN based 5G vRAN and Business Platform.

HFR is transforming into a Private 5G solution provider delivering BSS/OSS, vCore, vRAN and vertical applications for digital transformation in enterprise and industry.

my5G Soutlion

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HFR Biz & Service Mgt Platform

+

HFR NaaS Platform (Fydena)

+

HFR Cloud Native 5G SA vCore

+

HFR Open vRAN (O-CU, O-DU)

+

HFR Radio Unit (O-RU)

Radio Unit

- Support O-RAN function split 7-2 / eCPRI
- Auto Configuration and Self-Diagnostic Function
- Flexible Configuration for Multi-vendors, Multi-frequency Environment
- CBRS Alliance certified radio units have been commercially available and under large scale field testing.
- Strand mount, outdoor attach, indoor type radio units are ready

Fydena

- Is a business platform for Network as a Service (NaaS) using Blockchain technology
- Ensures trustworthy and cost-efficient business transactions among NaaS providers, buyers, and platform providers
- Enables SLA(service level agreement)-based offerings to meet the needs and requirements of NaaS buyers.
- Enlarges and secures business opportunities for NaaS providers with reduced costs.

5G SA vRAN

- Compact and fully virtualized CU, DU solution
- Various RU portfolios commercially proven supporting CPRI, eCPRI, low power, high power, Sub-6Ghz and mmWave
- Flexibility, adaptability and modular design deliver economical solution whether deployed with existing infrastructure or in a greenfield location
- Enterprise-class architecture with carrier-class performance and security features
- Capable of deploying in the cloud or on premises
- Supports multiple MNO networks

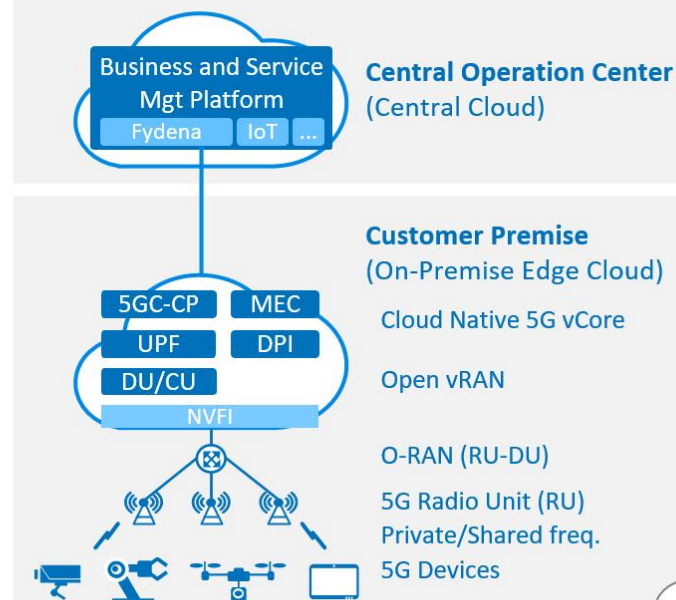
Biz & Service Mgt Platform

- Customer Portal
- Partner Portal
- Integrated BSS
- Fydena
- OSS/Orchestration
- Analytics
- IoT Platform
- Enterprise ICT Application Services

5G SA vCORE

- Compact and fully virtualized 5G vCore is standards-based solution
- Integrated 3GPP core elements: AMF, SMF, UPF, NRF, NSSF, PCF, CHF, etc.
- Supports small cells and macro cells
- Scalable from embedded single channel devices to several thousands of simultaneous media sessions.
- Supports network slicing features

HFR's E2E Private 5G Solution



Contact HFR



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