Future-Oriented Microwave Transport Network

Overview

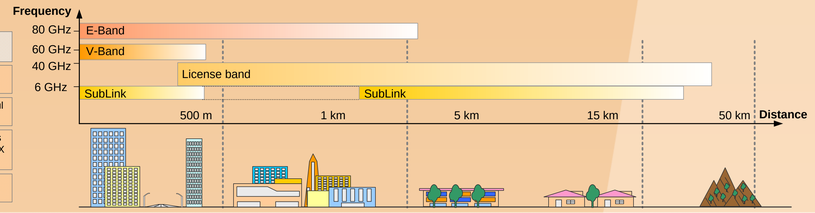
Microwave Transport Network

Microwave products are mainly used on mobile backhaul networks. A future-oriented microwave transport network must be able to evolve with mobile networks.

- **Flexible Evolution**: to expand frequencies, satisfy LTE backhaul requirements, and build networks with high availability
- **Large Bandwidth**: to improve frequency utilization and support transmission of mass data
- **Easy Maintenance**: to support large-scale networking and SDH-like monitoring, and provide effective troubleshooting measures

Microwave Frequency Resources

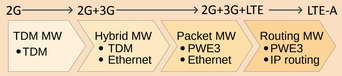
Frequency Band	Feature	Application Policy
License band	Deficient resources	To improve frequency utilization and total air-interface bandwidth
E-Band	Ultra-large bandwidth	Short-distance large-capacity backhaul Link aggregation
V-Band	License-free	Very-short distance backhaul for mass small cell deployment, with low CAPEX and low OPEX
SubLink	License-free	N-LOS/n-LOS backhaul



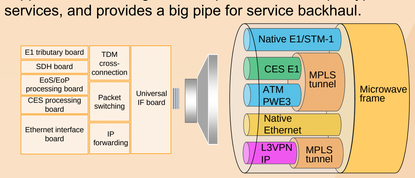
Flexible Evolution

Backhaul: Multi-service Access and Aggregation

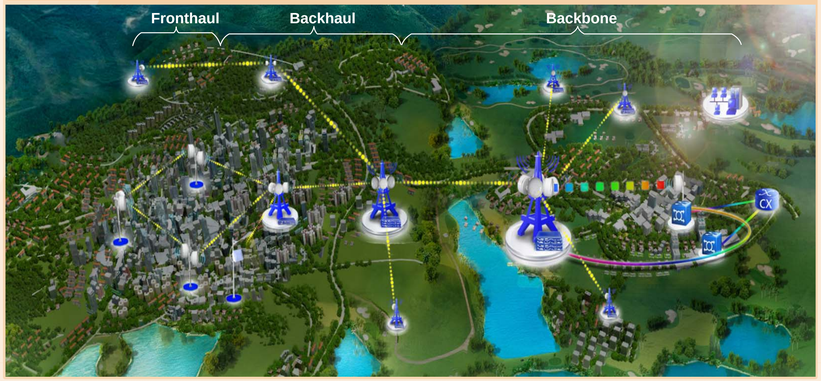
Wireless networks and aggregation networks are continuously evolving, which requires transport equipment to adapt to the changes in transmitted services.



Hybrid/packet/router integrated microwave equipment supports the receiving and encapsulation of multiple types of services, and provides a big pipe for service backhaul.

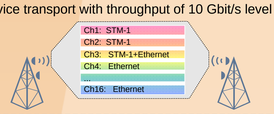


Typical Microwave Backhaul Network

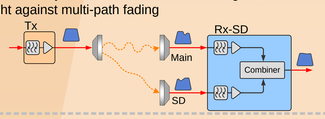


Backbone: Long haul microwave with fiber-level bandwidth

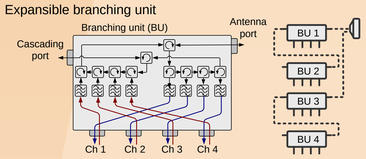
Multi-service transport with throughput of 10 Gbit/s level



Space diversity and IF-combination technologies, to fight against multi-path fading

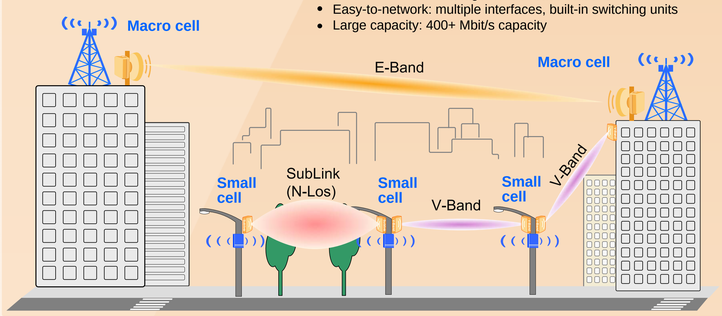


Expansible branching unit

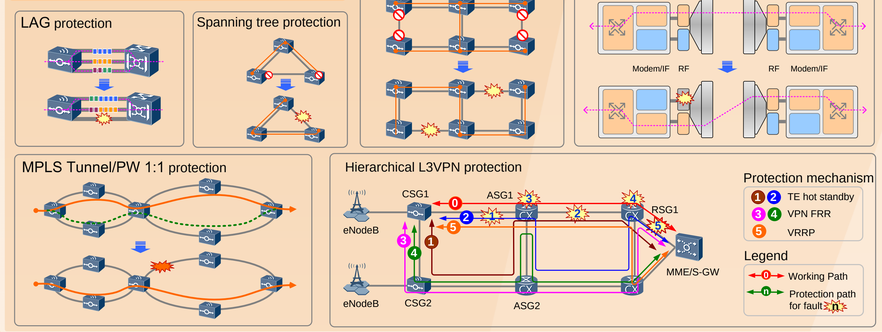


Fronthaul: Flexible Small Cell Bearer

- Easy-to-install: on poles, walls, lampposts
- Easy-to-maintain: configuration-free, Wi-Fi access, and co-management of base stations
- Easy-to-network: multiple interfaces, built-in switching units
- Large capacity: 400+ Mbit/s capacity



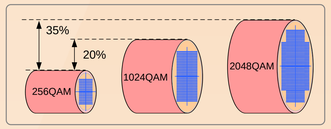
Protection: Networking-based Protection Schemes



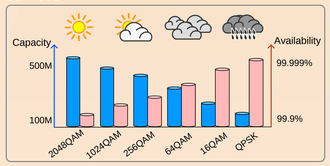
Large Bandwidth

2048QAM Ultra-high Modulation

Higher efficiency and bigger pipes

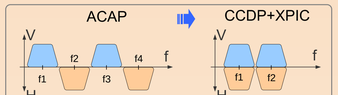


AM technology, ensuring availability of key services

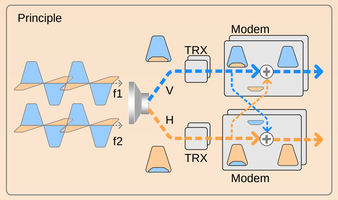


XPIC Technology

XPIC+CCDP, doubling frequency utilization



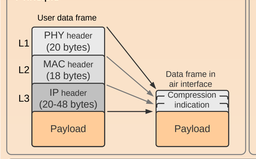
Principle



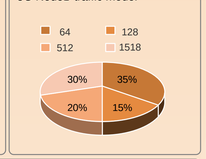
Frame Header Compression on Air Interfaces

- Three-level compression (PHY/MAC/IP or PHY/MAC/MPLS)
- Throughput increased by 50%+ in typical traffic models

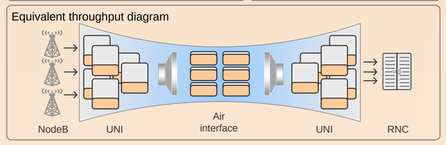
Principle



3G NodeB traffic model



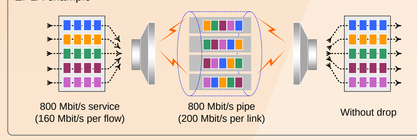
Equivalent throughput diagram



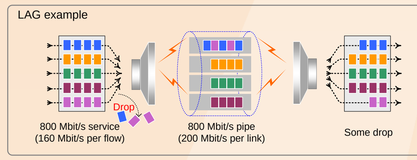
Enhanced Physical Link Aggregation (EPLA)

- Link protection & load-balancing at byte level
- P2P transmission of large-granule services at Gbit/s

EPLA example



LAG example



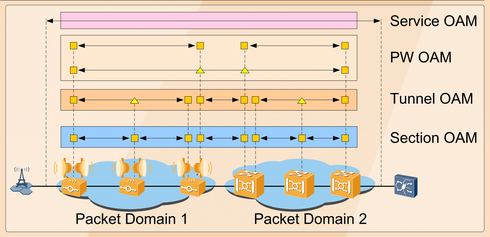
Easy Maintenance

Convergent O&M: E2E Maintenance of Large-scale Packet Transport Networks

Efficient Planning	Quick Deployment		Easy Maintenance	
Automatic Design and Plan	Meter-free Test	E2E Configuration	Intelligent Diagnosis	Visualization

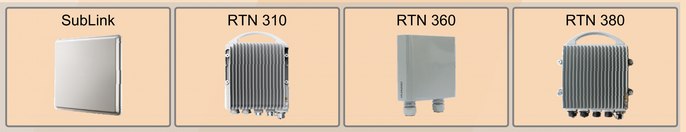
MPLS-TP OAM: IEEE&IETF-Compliant Packet Transport Maintenance Mode

Fault management	Continuity check (CC)	Proactive OAM
	Remote defect indication (RDI)	
	Alarm indication signal (AIS)	
	Loopback test (LB)	On-demand OAM
	Link trace (LT)	
Performance monitoring	Packet loss measurement (LM)	
	Delay measurement (DM)	



Huawei Microwave Portfolio

Full-outdoor MW Products



	SubLink 5/6 GHz	License band 13 to 38 GHz	V-Band 57 to 64 GHz	E-Band 71–76/81–86 GHz
Frequency Band				
Small Cell	●	●	●	●
Macro Cell	●	●		●
Aggregation Site				●
Throughput	400+ Mbit/s	500+ Mbit/s	400+ Mbit/s	2500+ Mbit/s
Main Features	OFDM	1+1, AM, XPIC	Automatic frequency selection	1+1, AMAC, CPRI

Split MW Products

ODU (6-42 GHz)
RFU (6-11 GHz)

Large Bandwidth
1 Gbit/s @1024QAM per link *
16 Gbit/s @16+0 long haul *
22xSTM-1 @N+1 long haul
*: Maximum value when frame header compression is enabled

Multiple Services
E1, Ethernet, STM-1/4, EoSDH, CES E1, EoPDH, ATM/IMA, ML-PPP

High Precision
Sync-E
IEEE 1588
1PPS+TOD
G.813 SEC

High Reliability

Radio link	TDM	Ethernet	MPLS	L3VPN
1+1 HSB/FD/SD	SNCP	ERPS	Tunnel 1:1 protection	TE tunnel hot standby
N+1 protection	LMSP	LAG	PW 1:1 protection	VPN FRR
PLA/EPLA	RMSP	STP		Grace restart

Acronyms

AM	Adaptive Modulation
ASG	Aggregation Site Gateway
CES	Circuit Emulation Service
CPRI	Common Public Radio Interface
CSG	Cell Site Gateway
E2E	End-to-End
EPLA	Enhanced Physical Link Aggregation
ERPS	Ethernet Ring Protection Switching
IMA	Inverse Multiplexing over ATM
LAG	Link Aggregation Group
LMSP	Linear Multiplex Section Protection
MPLS	MultiProtocol Label Switching
MW	Microwave
PLA	Physical Link Aggregation
PW	Pseudo Wire
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RSG	RNC Site Gateway
SD	Space Diversity
SNCP	Subnetwork Connection Protection
XPIC	Cross Polarization Interference Cancellation

More About E-band and Huawei MW Solutions

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