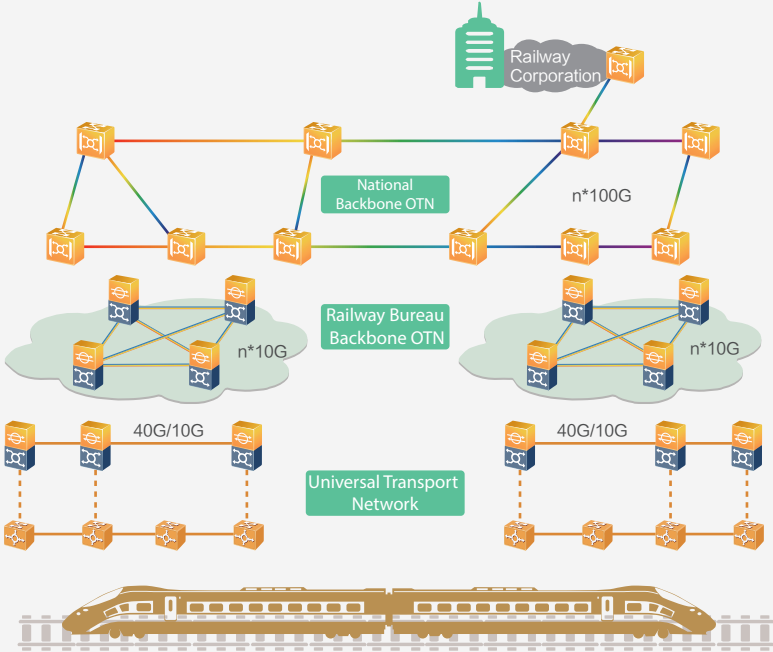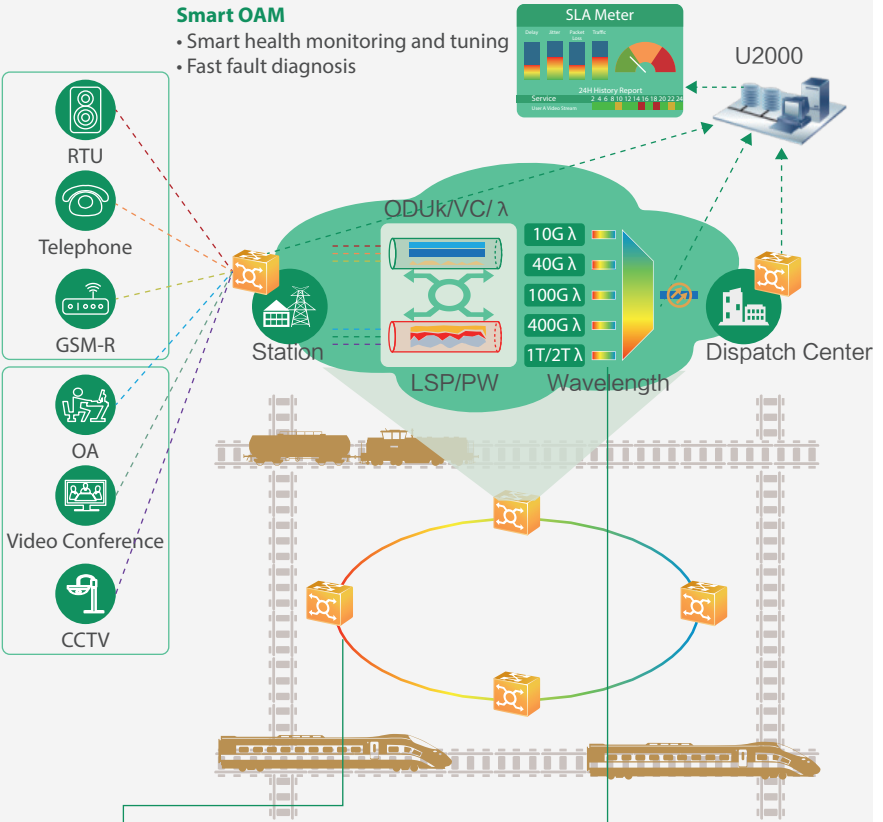# Huawei Railway Backbone OTN Solution

HUAWEI

# Challenges to Existing Railway Backbone Networks

◆ Railways are going both digital and wireless. Smart management, HD video surveillance, Wi-Fi connections, and wireless transmission services are becoming increasingly important to railway systems. Railway backbone networks face huge challenges.

Railway Corporation

National Backbone OTN

n*100G

Railway Bureau Backbone OTN

n*10G    n*10G

40G/10G    40G/10G

Universal Transport Network

**Smart OAM**
• Smart health monitoring and tuning
• Fast fault diagnosis

SLA Meter
Delay   Jitter   Packet   Traffic
24H History Report
2 4 6 8 10 12 14 16 18 20 22 24
Service
Live A Video Stream

U2000

RTU

Telephone

GSM-R

Station

ODUk/VC/λ

10G λ
40G λ
100G λ
400G λ
1T/2T λ

Wavelength

LSP/PW

Dispatch Center
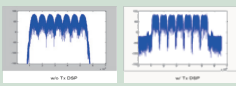
OA

Video Conference

CCTV

**Ultra-High Bandwidth**
• Meet the requirements of increased distances and sites and new services, such as video, Wi-Fi, wireless, and HD video surveillance.

**High Reliability and Security**
• Ensure security by physically isolating mission-critical services that are related to the security of railway systems.
• Ensure high reliability by enabling networks to prevent multiple points of failure.
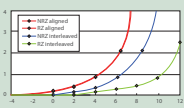
# Huawei Railway Backbone OTN Solution

**Tx-DSP Pre-Shaping**

No Tx-DSP: 100G pulse width > 10G

With Tx-DSP: 100G pulse width ≈ 10G

**RZ Modulation & Bit Interleaving**

Launch power = 10G

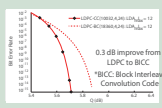Guard Band

**Enhanced QPSK**

Industry QPSK: Guard band > 100 GHZ

Huawei QPSK: Guard band ≈ 0

**Beyond 100G**
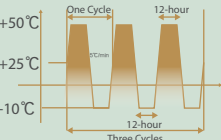- **6000 km**
- **Reliable**

**Advanced FEC Algorithm**

N-bit quantization, 100G NCG > 11.8 dB

+50℃   One Cycle   12-hour

+25℃

-10℃   12-hour

Three Cycles

**72-hour High & Low Temperature Cycling Verification**

**Partner with the Best Quality Supplier**

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**Wavelengths and channels are physically isolated to avoid interference and improve security.**

Telephone → VC

Wireless → VC

TDCS/CTC → VC

STM-N  ODU1

LTE → 

TMIS → ODU0

VS → 

VC → ODU0

ODU2

Development → 

Transport → ODU0

PIS → ODU0

Marketing → 

Internet → ODU0

Communication → ODU0

ODU2

MS-OTN 10G/100G

All support 1588v2
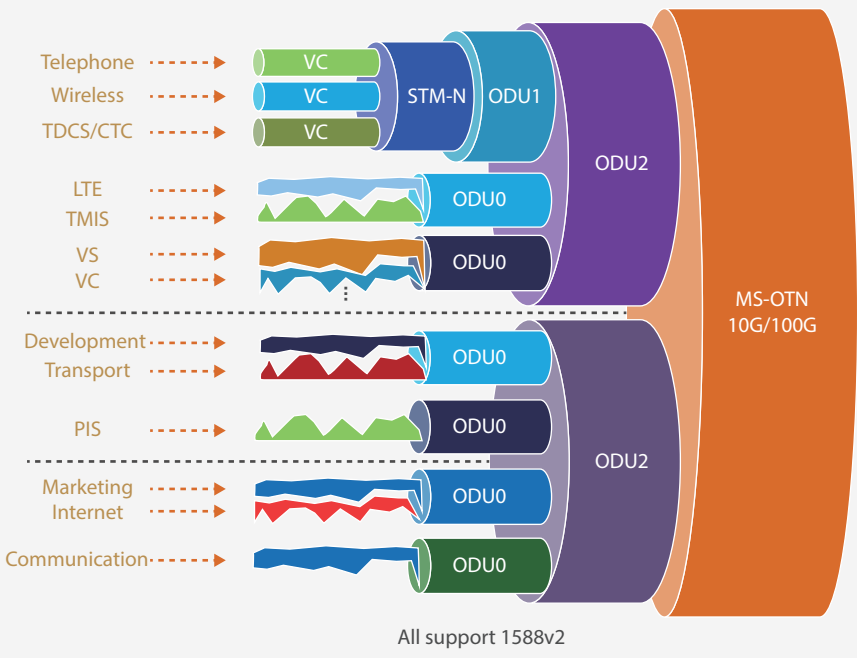
**Total BW: 101.5–107.5G**

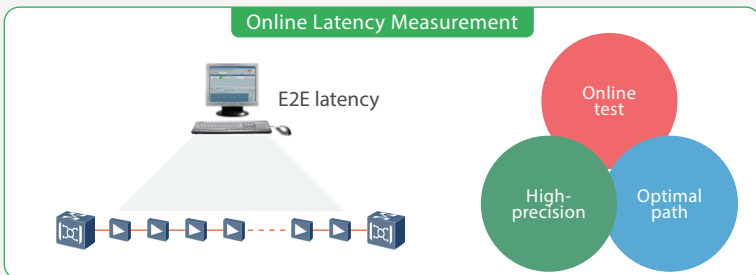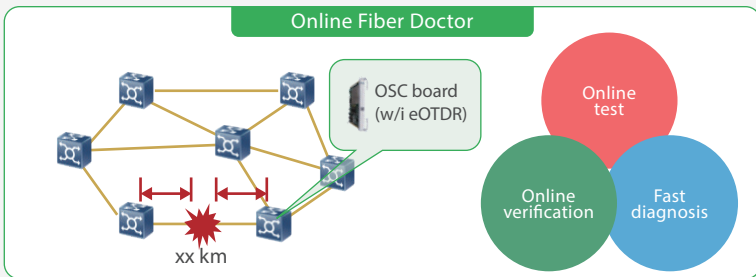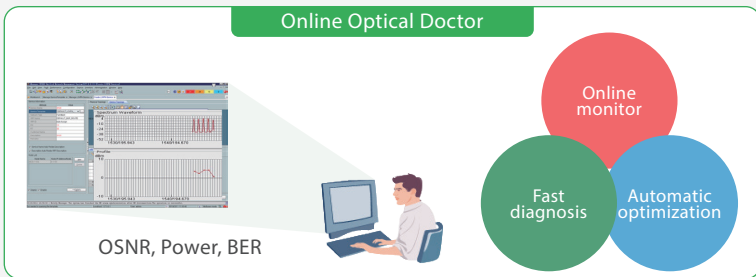## OTN ensures high network reliability by providing multiple types of protection to prevent multiple points of failure.

| | | | |
|---|---|---|---|
| 1 | Equipment 1+1 protection | FC/GE/10GE Server | OLP · OTU-1 #1 · OTU-2 #2 |
| 2 | Client 1+1 protection | FC/GE/10GE Server | OLP/DCP · OTU-1 · OTU-2 |
| 3 | ODUk SNCP protection | FC/GE/10GE Server | TOA · NS2 · NS2 |
| 4 | Intra1+1 protection | FC/GE/10GE Server | OTU |
| 5 | Optical line 1+1 protection | FC/GE/10GE Server | OTU · OLP |

## The U2000 can monitor management and commissioning services, simplifying O&M.

### Online Optical Doctor

OSNR, Power, BER

- Online monitor
- Fast diagnosis
- Automatic optimization

### Online Fiber Doctor

OSC board (w/i eOTDR)

xx km

- Online test
- Online verification
- Fast diagnosis

### Online Latency Measurement

E2E latency

- Online test
- High-precision
- Optimal path

# Product Family

## OSN 8800 T16 | OSN 8800 T32 | OSN 8800 T64



OSN 8800 T16     OSN 8800 T32     OSN 8800 T64

| Dimensions (H x W x D)(mm) | | 450 × 498 × 295 | 900 × 498 × 295 | 900 × 498 × 580 |
|---|---|---|---|---|
| Service Slots | | 16 | 32 | 64 |
| Electrical Switching Capability | OTN | 1.6T ODUk | 3.2T ODUk | 6.4T ODUk |
| | Packet | 800G | 1.6T | - |
| | TDM | 640G VC-4 20G VC-3/VC-12 | 1.28T VC-4 80G VC-3/VC-12 | 1.28T VC-4 80G VC-3/VC-12 |
| | ODUk | ODUk (k=0, 1, 2, 2e, 3, 4, flex) | | |
| Maximum Line Rate | | 200G | | |

## OSN 9800 U16 | OSN 9800 U32 | OSN 9800 U64



OSN 9800 U16     OSN 9800 U32     OSN 9800 U64

| Dimensions (H x W x D)(mm) | | 847 × 442 × 295 | 1900 × 498 × 295 | 2200 × 600 × 600 |
|---|---|---|---|---|
| Service Slots | | 14 | 32 | 64 |
| Electrical Switching Capability | OTN | 5.6T ODUk | 12.8T ODUk | 25.6T ODUk |
| | Packet | 2.8T | 6.4T | 12.8T |
| | TDM | 1.12T VC-4 80G VC-3/VC-12 | 2.56T VC-4 80G VC-3/VC-12 | 5.12T VC-4 80G VC-3/VC-12 |
| | ODUk | ODUk (k=0, 1, 2, 2e, 3, 4, flex) | | |
| Maximum Line Rate | | 400G | | |

Scan this QR code for further details



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By Enterprise Transport MO & Information Dept.