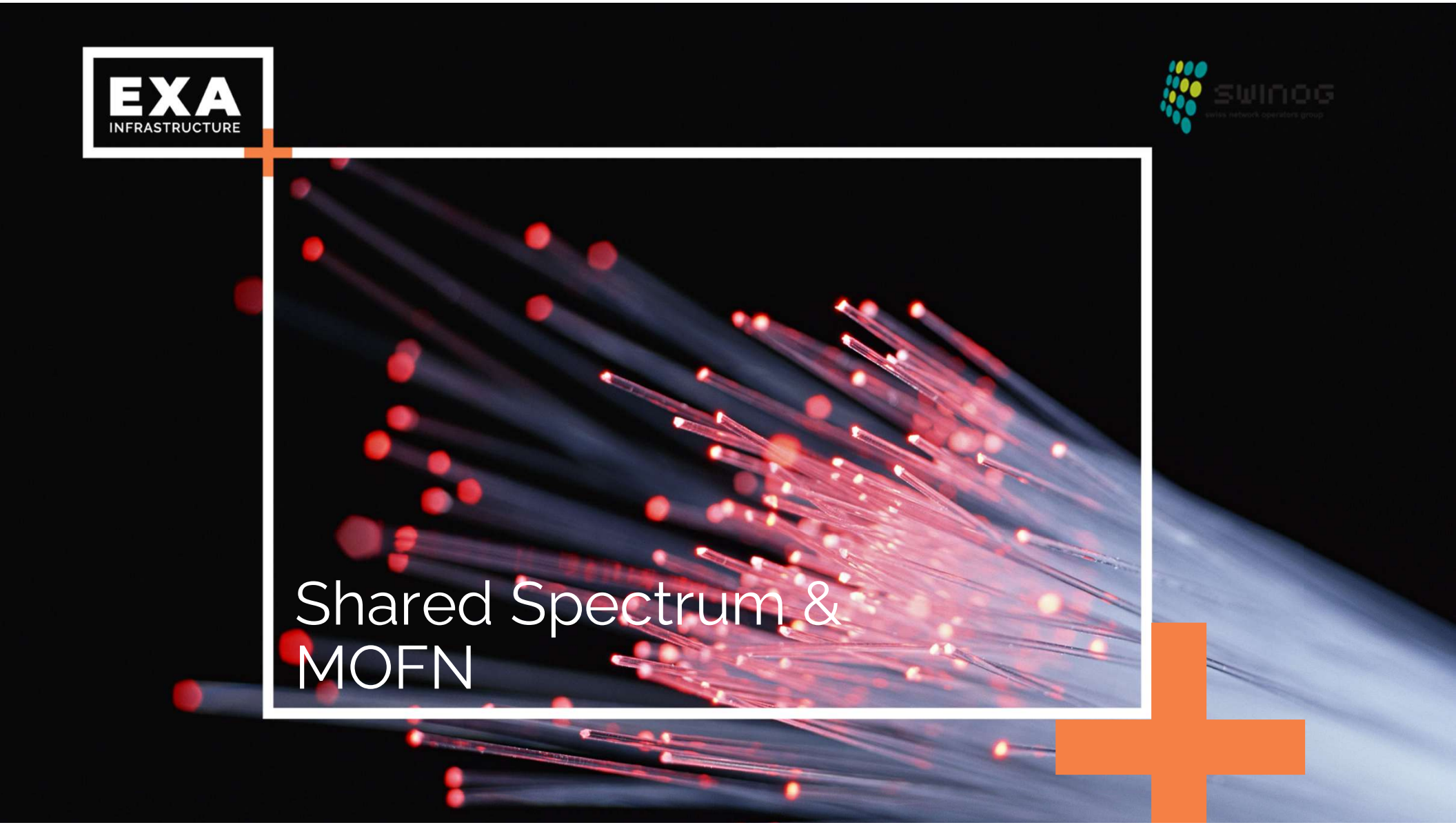

EXA
INFRASTRUCTURE
swinog
Shared Spectrum &
MOFN

Our network

174,500
Routes km fibre network

3+ M
Fibre Km

37
Number of countries

6,000+
Metro route km

300+
Number of cities

8
Transatlantic cables

11
Subsea cable segments

<60ms
New York to London

29
Subsea cable landing stations

500+
Number of PoPs

220+ TB
Traffic transported on our network

540+
ILAs

400 Gbps
Wavelength enabled network

18,000
km of owned subsea cable in operation

25
of the world's 30 biggest Service Providers served

Traditional services

	Vendor	Customer	Key notes
Wavelength	• Manages fibre and ILA physical infrastructure • Owns & manages DWDM line system • Owns & manages transponder cards • Service activation	• Connect to demarcation point	• **Lower bandwidth** • **Higher cost/Gbit** • **Plug and Play** • **Minimal customer obligations**

THE GAP

Dark Fibre	Manages fibre and ILA physical infrastructure ▪ Rights of way ▪ Land, power, permits ▪ Monitoring ▪ Security & accesses ▪ Maintenance	• Manages network at optical and electrical level. • Network design, procurement I&C and testing • Spares and maintenance • Service activation	• **Highest bandwidth** • **Higher complexity** • **Manpower requirements (transmission/field teams)** • **Licensing requirements** • **Customer has full control**

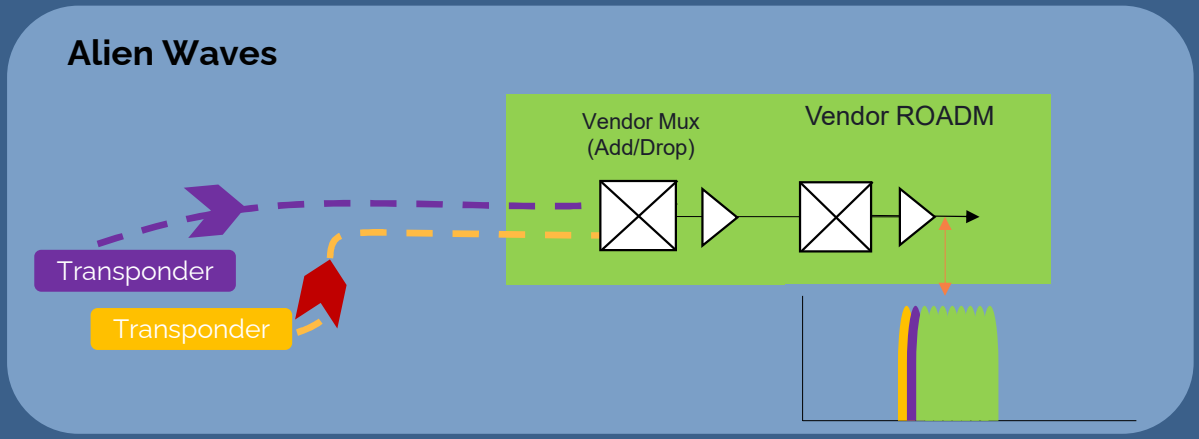
What is Shared Spectrum

Spectrum Sharing is a product that enables clients to use a portion of spectrum (GHz bandwidth) within the photonic layer.

- **Clients bring their own transponders to establish connections and manage signal transmission.**
- **Vendor assigns, delivers and controls the physical spectrum**
- **Has both Terrestrial and Submarine* applications (*may require ASE)**

Alien waves

- Oldest form of spectrum sharing
- Alien Waves clients are directly connected with their transponders to vendor mux architecture

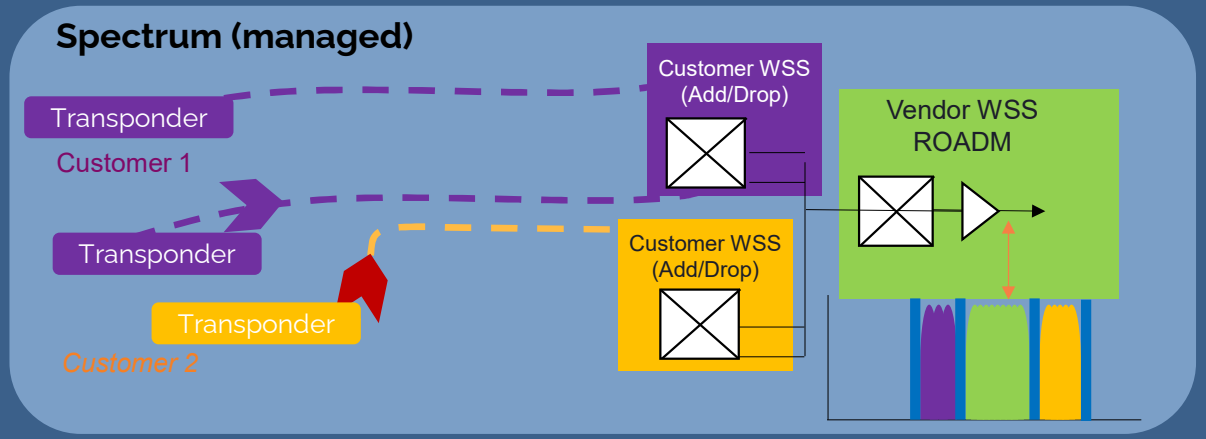


Advantages:
- Cheap to implement
- Lower hardware requirements

Disadvantages:
- Limited monitoring
- Less control
- Less flexible (only agreed transmission modes)
- One XC per wave

Managed Spectrum

- Customer mux/WSS introduced
- Channels assigned/managed by Vendor



Advantages:

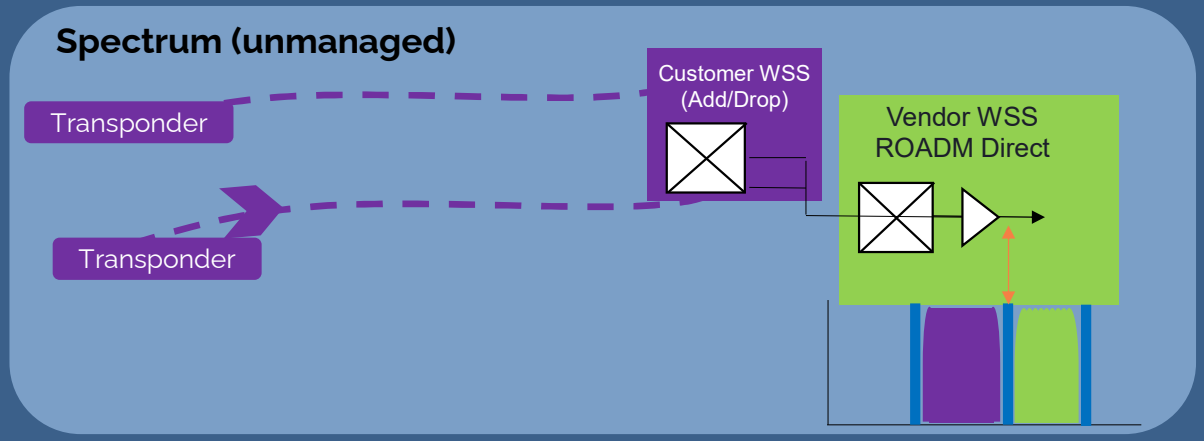
- Advanced monitoring
- Greater power control/policing
- Privacy can be guaranteed
- Single XC

Disadvantages:

- Requires customer LTE
- Assignment changes need to be negotiated

Unmanaged Spectrum

- Spectral block assigned by vendor
- Channels assigned/managed by customer



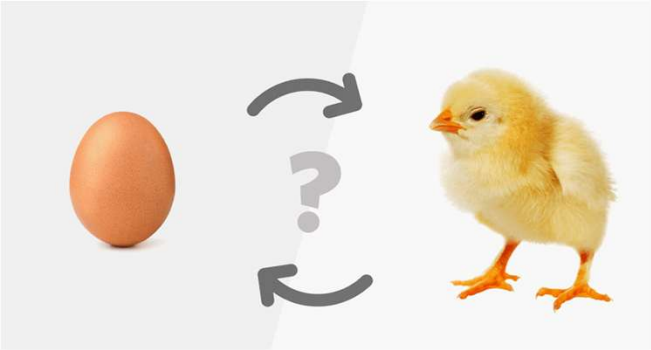
Advantages:

- Massive flexibility
- Advanced monitoring
- Greater power control/policing
- Privacy can be guaranteed
- Single XC

Disadvantages:

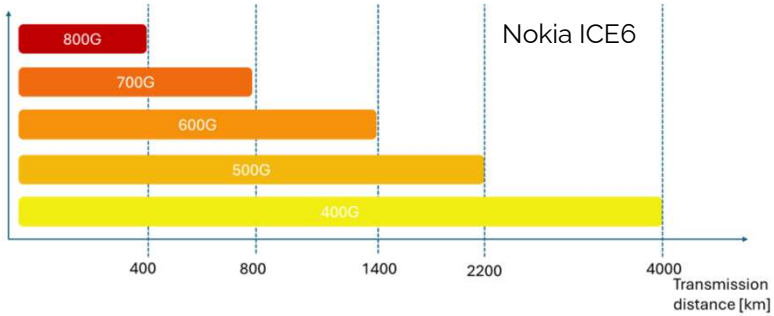
- Requires customer LTE
- Customer may require power control
- Requires greater knowledge

How much spectrum is required?



Factors to limit line rate
- Distance
- Fibre quality
- ROADM count
- Amplification (RAMAN vrs EDFA)
- Transponder generation

Vendor / customer discussion required
- How much capacity is required
  => how much spectrum is required
- Baselining/Acceptance criteria
- Change process (re-assignments, expansions/contractions)



What is MOFN?

Managed Optical Fiber Network

- Service Provider built dedicated fiber network provided as a managed service
- Aims to deliver carrier-grade bandwidth using dedicated fiber and DWDM technologies.
- Reduces operational complexity for the customer by handling:
  - **Procurement, deployment, configuration, and maintenance**
- Scalable capacity with the ability to increase bandwidth as business needs grow.

Why MOFN?

Organisational agility & TTM

Network is built to customer specifications

No need to ramp up operational engine in region

Regulations

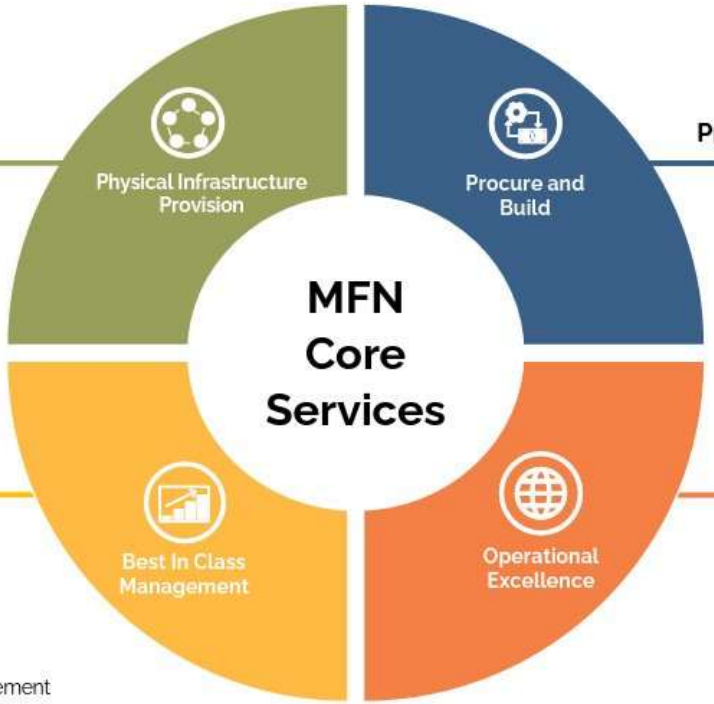
Lack of Human Capital

Secure 'air gapped' private network

Lower cost per bit

Fibre Tax Savings (UK)

Standard offering



Dark Fibre and Colocation

- Provision underlying dark fibre
- Prepare colocation facilities for equipment installation
- Integrate 3rd party infrastructure where required
- Construct new fibre where required

Service Assurance

- Integrated into NMS and OSS systems
- Technical Design Authority
- Change, Configuration and Capacity management
- Bespoke reporting and Service management options
- Northbound NMS interface options

Project managed deployment

- System design & validation
- Hardware procurement
- Project management
- System deployment and testing
- Documentation and handover to operations

Technical Operations

- 24x7 NOC Monitoring and Fault management
- 1st , 2nd & 3rd line technical support
- Logistics, sparing and hardware replacement
- FLM dispatch and remote hands

	Wavelength	Spectrum	MOFN	Dark Fibre
Vendor	• Manages fibre and ILA physical infrastructure • Owns & manages DWDM line system • Owns & manages transponder cards • Service activation	• Manages fibre and ILA physical infrastructure • Owns & manages DWDM line system	• Manages network at every level (physical, optical and electrical) • Network design, procurement I&C and testing • Spares and maintenance • Service activation	Manages fibre and ILA physical infrastructure ▪ Rights of way ▪ Land, power, permits ▪ Monitoring ▪ Security & accesses ▪ Maintenance
Client	• Connect to demarcation point	• Own & Manage transponders • Service activation	• Connect to demarcation point	• Manages network at optical and electrical level. • Network design, procurement I&C and testing • Spares and maintenance • Service activation

- **Lower bandwidth**
- **Higher cost/Gbit**
- **Plug and Play**
- **Minimal customer obligations**

- **Highest bandwidth**
- **Ownership economics**
- **Higher complexity**
- **Customer has full control**

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Thank you