



FLAG Telecom

Global Transmission Network Overview

Connecting Continents. Connecting Cultures



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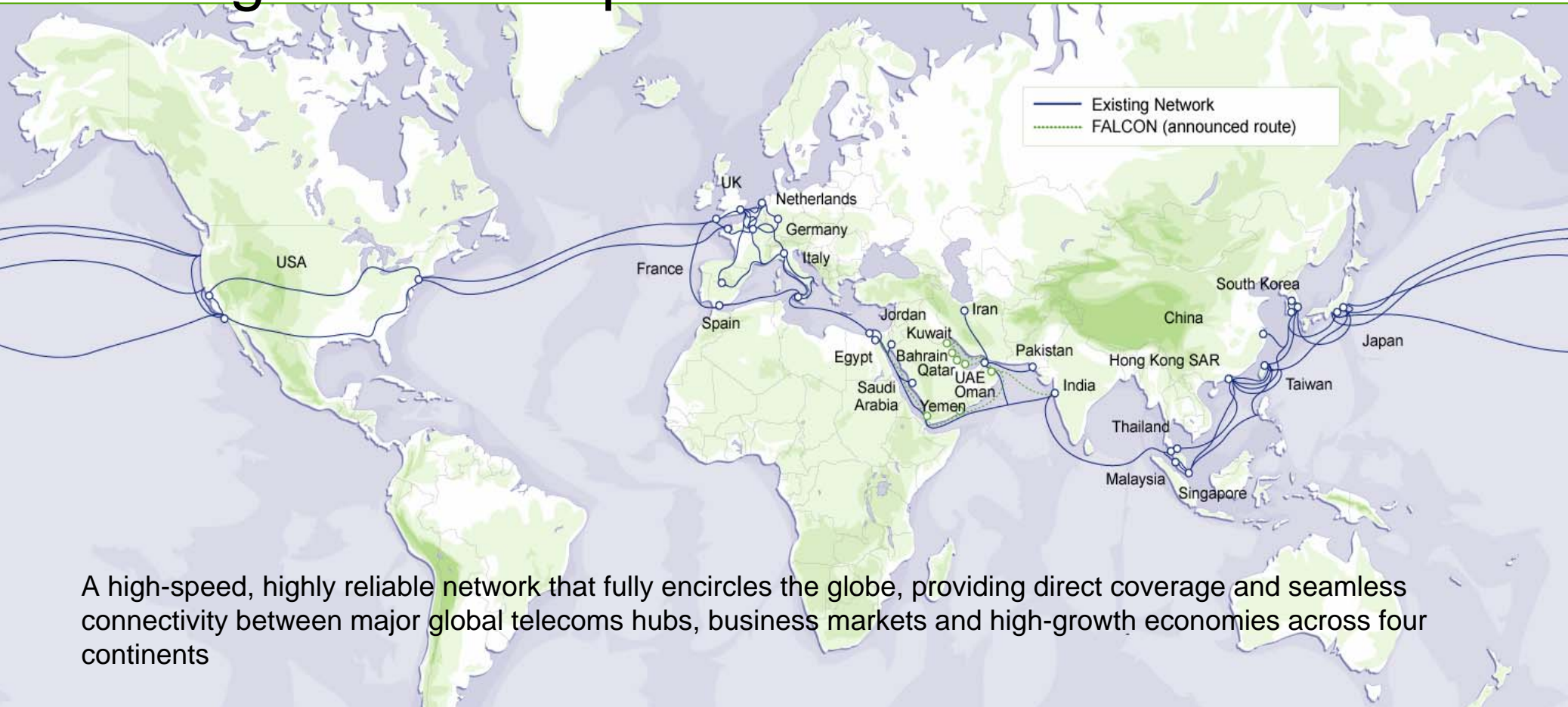


Introduction

- ❑ FLAG Telecom is a leading provider of international network transport, connectivity and data services to the wholesale communications & Internet communities
- ❑ Our services are delivered over an extensive fibre-optic and MPLS based IP network that we own and manage
- ❑ The network fully encircles the globe, connecting key markets in Asia, Europe, the Middle East and the USA
 - This network touches over 75% of the world's population
- ❑ The network seamlessly connects several submarine and terrestrial cable systems
 - Incorporating self-built and purchased facilities across Europe, Mediterranean, Arabian Gulf, Indian Ocean, South China Sea, Pacific, North America and Atlantic
- ❑ FLAG's transmission services provide the foundations underpinning the networks of many of the world's largest carriers and Internet operators



Our global fibre-optic / SDH network



A high-speed, highly reliable network that fully encircles the globe, providing direct coverage and seamless connectivity between major global telecoms hubs, business markets and high-growth economies across four continents

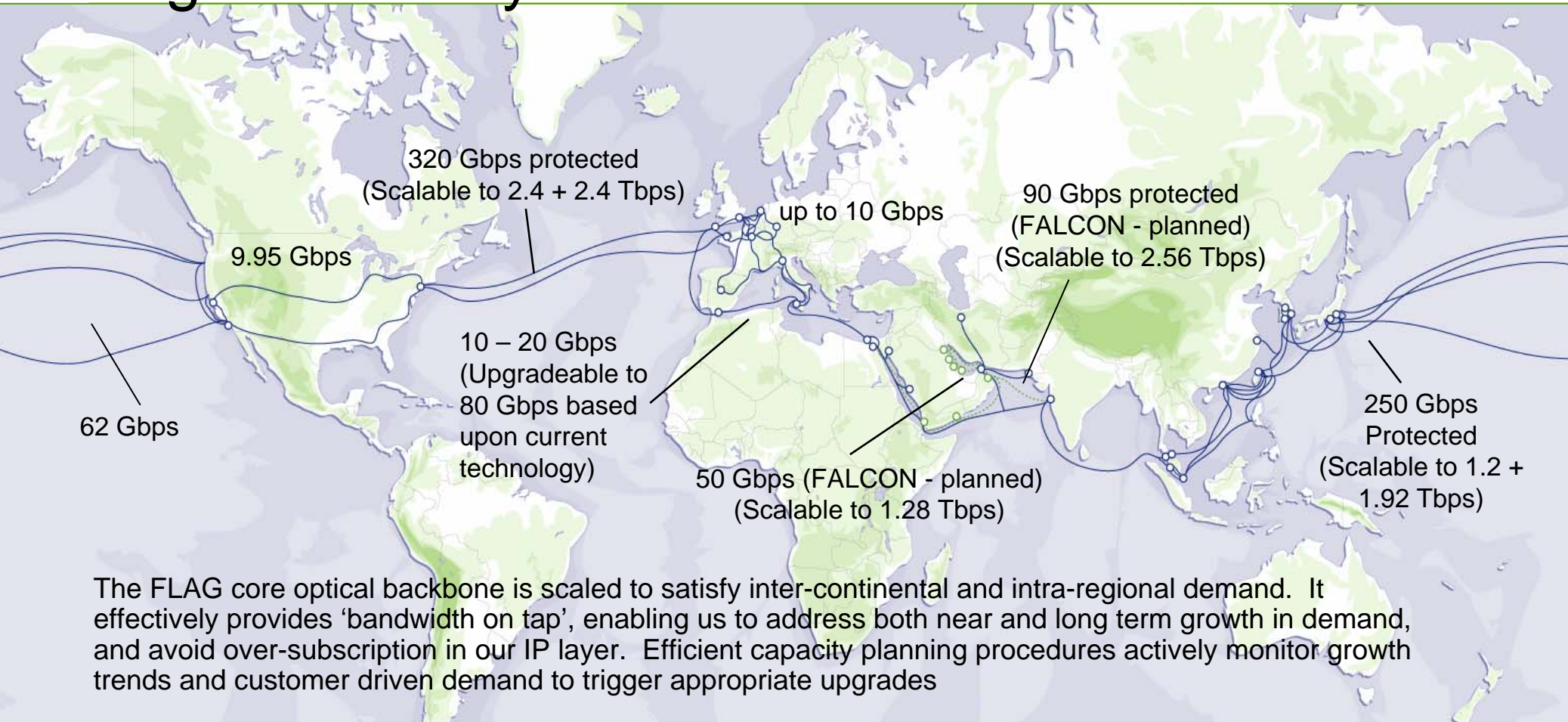


Architecture overview

- ❏ The FLAG global network is fully optical and is predominantly a submarine based network
 - Terrestrial networks are implemented to provide backhaul connectivity to domestic city nodes, and to provide terrestrial links between submarine segments (USA, Europe, Egypt, Thailand)
- ❏ It is designed, engineered and operated to provide highly reliable, scalable and cost effective transmission
- ❏ FLAG adheres to industry standards in all aspects on our network, engineering, service delivery and operations
- ❏ The network is fully SDH / SONET compatible and supports a wide range of standard optical and electrical interfaces and speeds for customer circuits
- ❏ FLAG works with leading vendors for all component elements of the network
- ❏ FLAG nodes are located in key landing stations and 'carrier hotels' to provide ready access to other networks



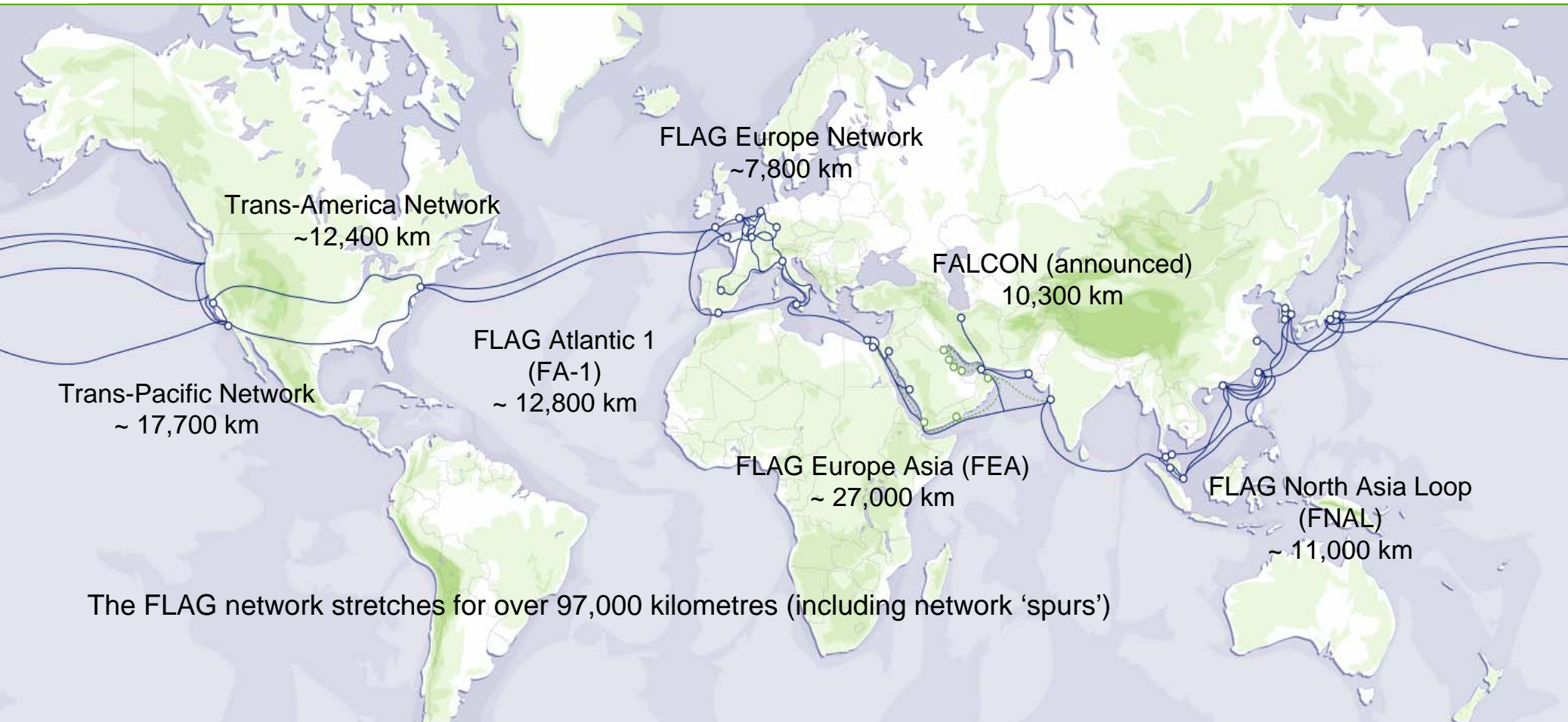
High scalability



The FLAG core optical backbone is scaled to satisfy inter-continental and intra-regional demand. It effectively provides 'bandwidth on tap', enabling us to address both near and long term growth in demand, and avoid over-subscription in our IP layer. Efficient capacity planning procedures actively monitor growth trends and customer driven demand to trigger appropriate upgrades



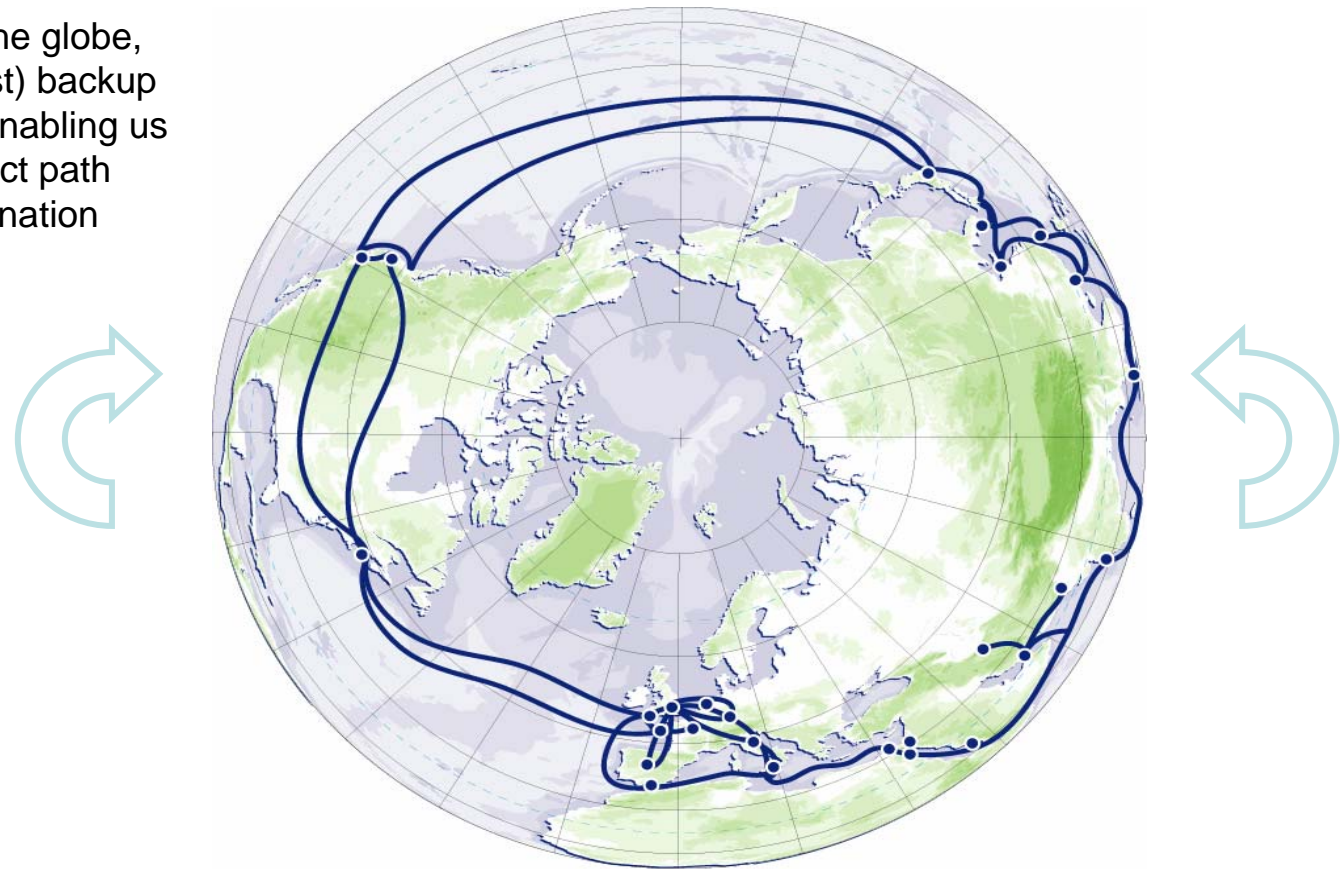
Route distances





Seamless global delivery

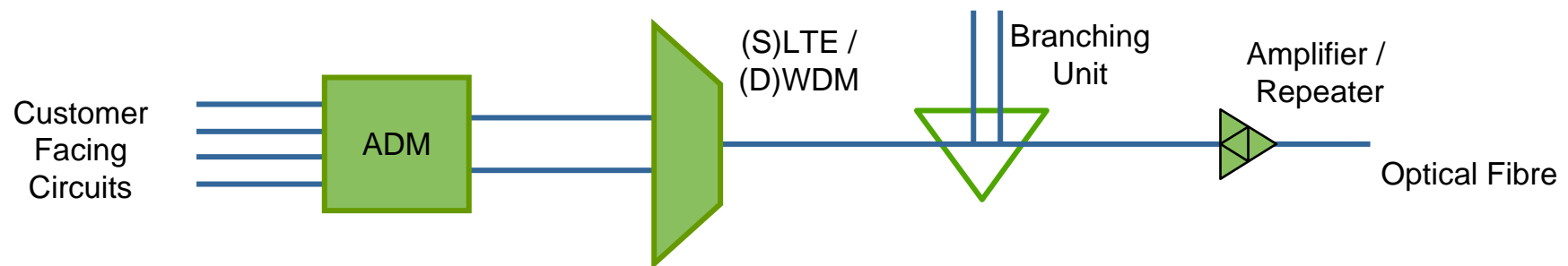
The network fully encircles the globe, providing an on-net (east/west) backup path for customer traffic and enabling us to implement the most direct path between source and destination





Common network components

- Several generic components are employed throughout the network
 - Specific equipment and suppliers used varies from system to system due to geographic, route distance, volume, age and feature issues
 - Additional equipment is employed in specific network systems for protection and cross connect purposes



Add Drop Multiplexers in FLAG PoPs provide the physical interface to customers at a range of SDH data rates, acting as the cross connect and termination / configuration point for customer circuits. They aggregate signals onto the line termination equipment.

Line Terminal Equipment, located at Submarine landing stations or terrestrial nodes, multiplex SDH signals onto a single optical fibre pair. They provide error correction, alarm and supervisory facilities. Integrated or combined (Dense) Wavelength Division Multiplexing facilities enable multiple wavelengths to be multiplexed.

Branching Units are used to 'drop' local optical connections from a submarine cable to the shore, providing a 'splice & joint' function. They provide an efficient and resilient mechanism of deploying a cable with multiple landing stations, without having to route the entire cable via the shoreline

Amplifiers and repeaters are employed to maintain signal strength along the length of the fibre. Amplifiers increase the intensity of the laser without optical-electro conversion. However, signal attenuation through glass necessitates the use of Repeaters at regular intervals that regenerate the original digital signal through optical-electrical-optical conversion.



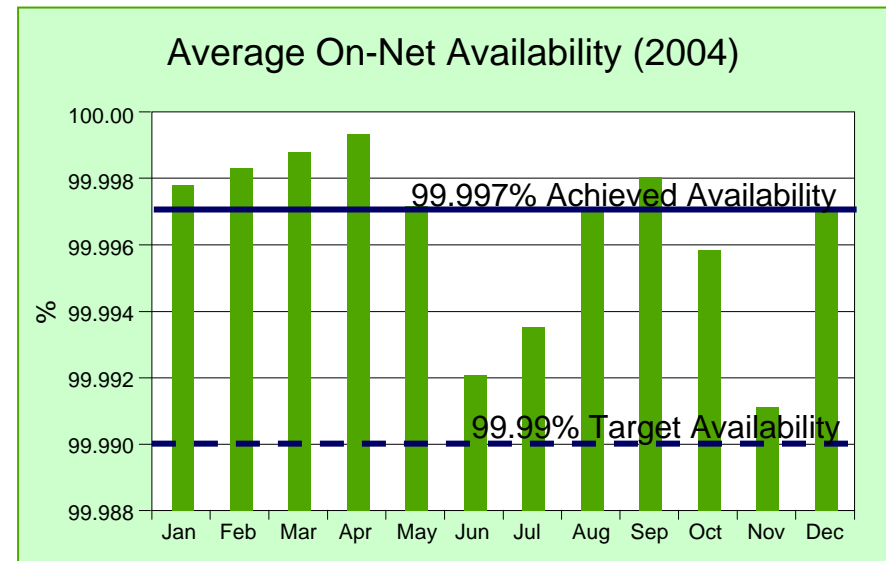
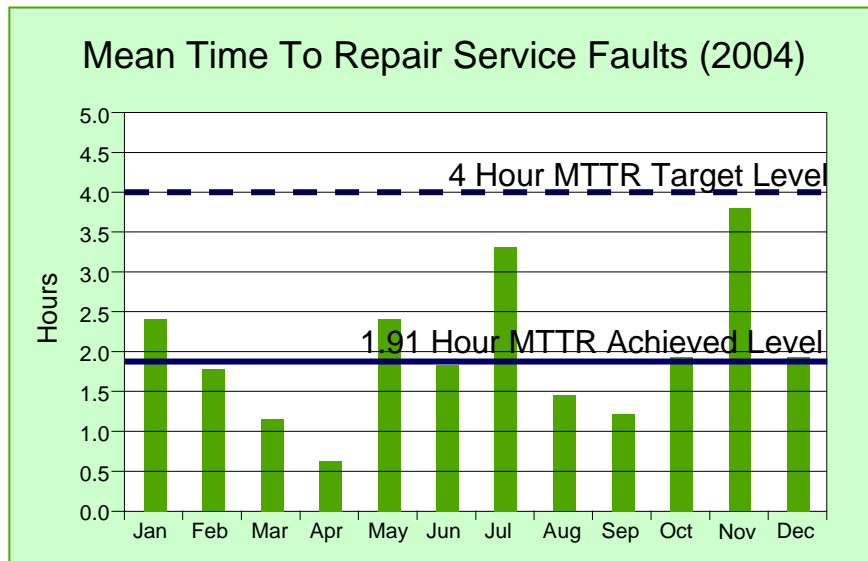
Performance measures

- ❏ A range of measures are taken to protect FLAG's global network and to ensure highly resilient and reliable traffic delivery
- ❏ Automatic or manual protection paths are used throughout the network for protected customer circuits
- ❏ A range of common automatic protection techniques are used within specific FLAG system components:
 - Sub Network Connection Protection (SNCP), Multiplex Section – Shared Protection Ring (MS-SPRing) or Mutiplex Section Protection (MSP1+1) network and interface cards
- ❏ FLAG is able to provide on-net east/west protection paths where appropriate
- ❏ Further specific measures are taken for individual network systems
 - Including fibre diversity, SDH loops, Optical Protection Switching (OPS), span switching, dual access cards etc.
- ❏ Subsea cables follow carefully plotted routes, are extensively armoured and are buried close to shore to minimise the impacts of natural disasters and the risk of local cuts
- ❏ All PoPs are strictly engineered to ensure carrier-grade performance
 - Include all necessary cabling, access, environmental, power and security failsafes



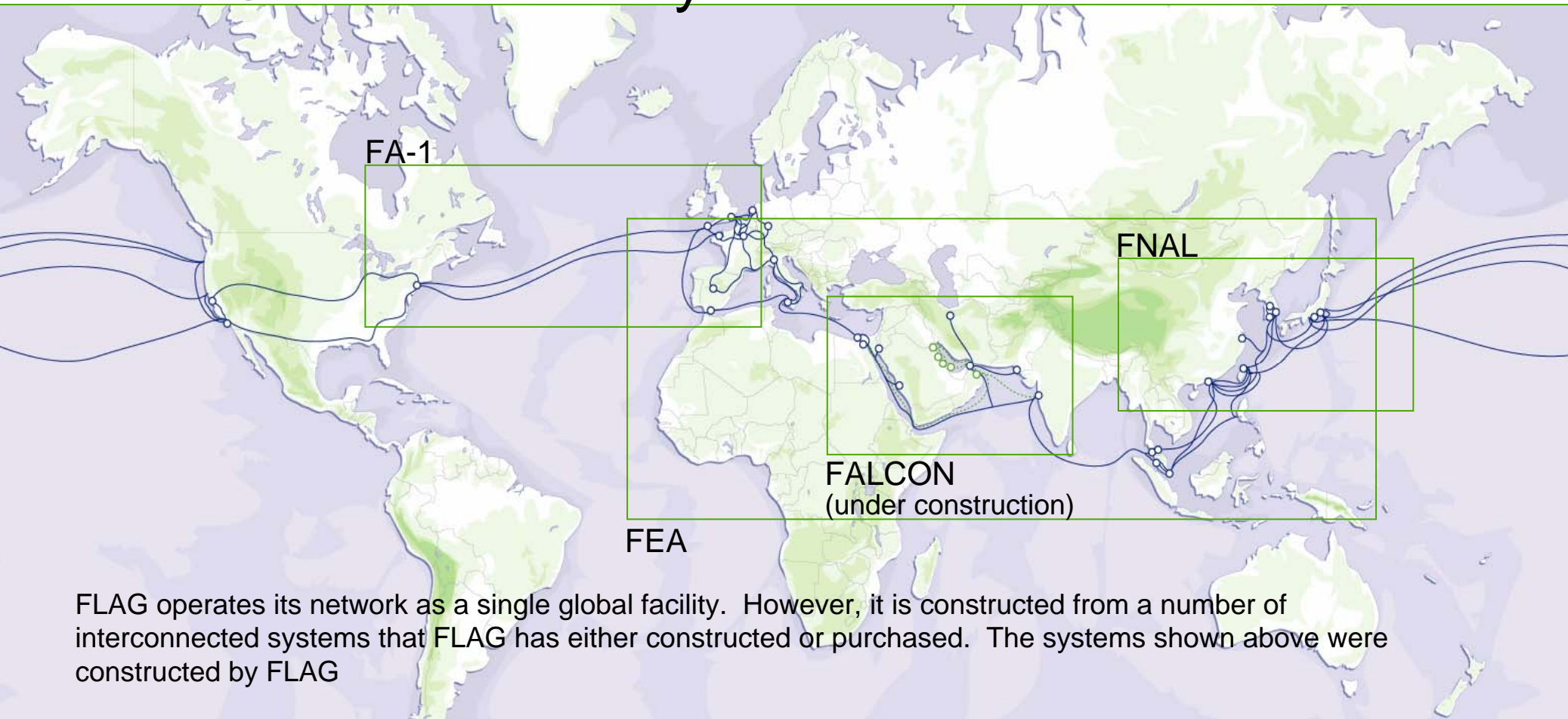
Long standing reputation for outstanding quality & performance

- ❏ The performance measures taken by FLAG enable us to offer best-in-class quality
- ❏ FLAG overall on-net network availability was 99.997% during 2004
 - It has consistently been higher than 99.99% for over 3 years
- ❏ For those rare faults encountered, average on-net 'Mean Time to Repair' (MTTR) for customer service faults was 1.91 hours during 2004
 - It has consistently been lower than 4 hours for over 3 years





FLAG constructed systems



FLAG operates its network as a single global facility. However, it is constructed from a number of interconnected systems that FLAG has either constructed or purchased. The systems shown above were constructed by FLAG



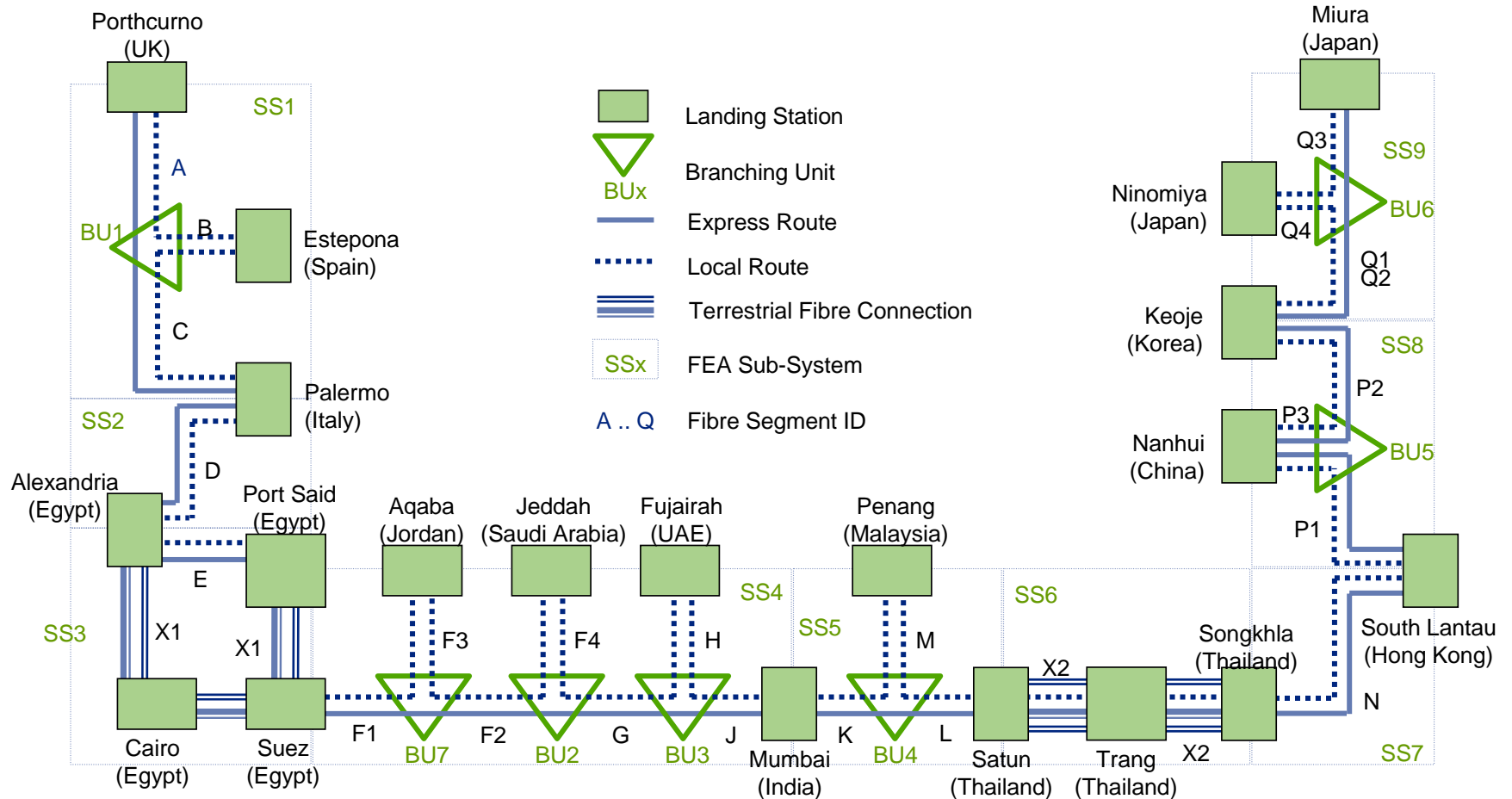
FLAG Europe Asia (FEA)

FEA was the world's first independent, competitive cable system to serve the Middle East and Asian markets. It was the first independent cable system to land in China, Saudi Arabia and Jordan, and it remains the world's longest privately funded undersea system





FEA topology





FEA overview

- ❑ FLAG constructed, owns and operates FEA
- ❑ In-service: 1997
- ❑ FEA consists of nine sub-systems, comprising a total of 25 segments
 - This identification scheme is used for construction, operations & maintenance and restoration purposes
- ❑ Each sub-system comprises two or more terminal stations connected by two fibre pairs
 - Express and local fibres
- ❑ 'Local' and 'Express' route configuration provides efficient and high performance delivery
 - 'Express' route provides a rapid path between high volume routes to minimise delivery delay for inter-continental circuits
 - 'Local' route provides a local access and intra-regional capability
- ❑ WDM used to increase capacity in the system from the initial 10 Gbps capacity
 - Current technology will allow an upgrade to 80 Gbps
- ❑ FEA is resiliently interconnected with FA-1 in the UK and FNAL in Hong Kong and Japan
 - UK interconnect: Porthcurno – Skewjack
 - Hong Kong interconnect: Tong Fuk – South Lantau
 - Japan interconnect: Miura - Wada






FALCON (under construction)



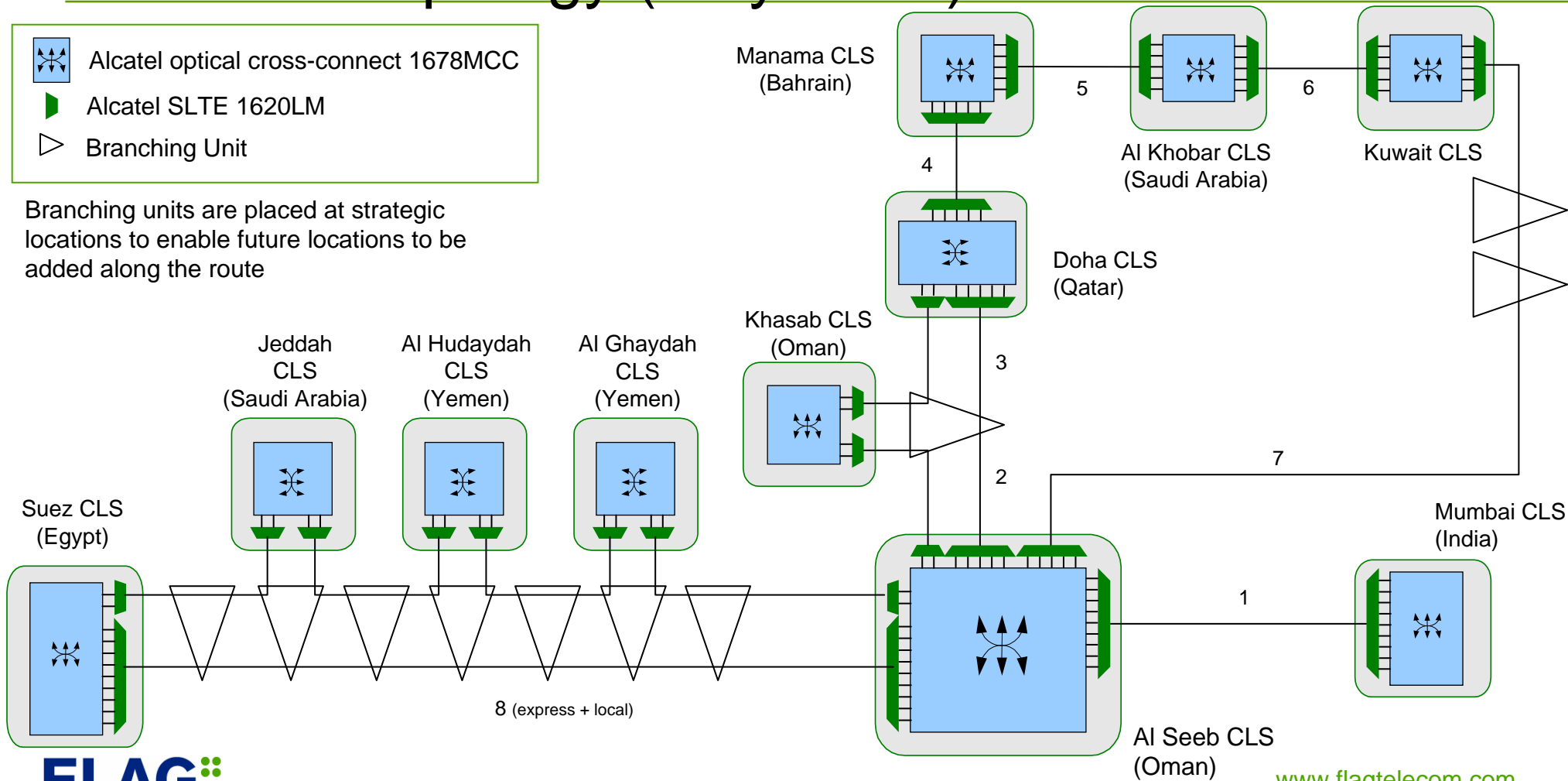
A new submarine cable system to address the broadband demand that exists to and from the high growth communications markets in the Middle East and India



FALCON topology (May 2005)

 Alcatel optical cross-connect 1678MCC
 Alcatel SLTE 1620LM
 Branching Unit

Branching units are placed at strategic locations to enable future locations to be added along the route





FALCON system profile

❏ Suez-Muscat-Mumbai

- 6,900km submarine system with 90 Gbps initial capacity
- Four fibre pairs, with design capacity of 64 wavelengths per fibre pair, equalling 2.56 Tbps

❏ Gulf Loop

- Self healing 3,400km loop system with 50 Gbps initial capacity
- Two fibre pairs, with design capacity of 64 wavelengths per fibre pair, equalling 1.28 Tbps

❏ The system has been designed to enable additional 'spurs' to be inserted during and post initial cable deployment

- Branching units inserted at key locations during first lay to support other interested landing parties along the route as their communications needs develop and grow

❏ Further extensions under review

❏ Advanced network engineering design

- Comprehensive protection mechanisms (optical protection, MSP1+1, MS-Spring, SDH), equipment redundancy built into SLTE, PFE, power etc., dual landing points wherever possible, double armoured and buried cable where necessary



FALCON overview (Q3 2005)

- ❑ FLAG is managing the entire design, construction and operations process
- ❑ Planning phase complete and route selected (Q1 / Q2 2005)
 - Thorough planning phase included geophysical, oceanographic, hydrodynamic (sediment, current movement) and environmental analysis, plus an analysis of human factors such as external aggression, pipelines (oil, gas, & sewage outfalls etc), cables (military, power & telecoms etc), commercial fisheries, dredging and shipping activities.
 - Marine surveys, landing site reviews and permit activities complete
- ❑ Supplier contract awarded to Alcatel, a leading provider of large-scale turnkey submarine cable projects
- ❑ Implementation phase underway
 - Cable anchored in Oman and en-route to Mumbai early August 2005
- ❑ Initial RFS in Q4 '05
- ❑ Negotiations with other interested landing parties are continuing
 - Design enables spurs to be added along the cable route to match evolving local communications requirements



FLAG metro rings & extended reach

- ❧ FLAG owns and operates metro rings, connecting major telehouses in the following locations:
 - London
 - New York
 - Paris
 - Tokyo

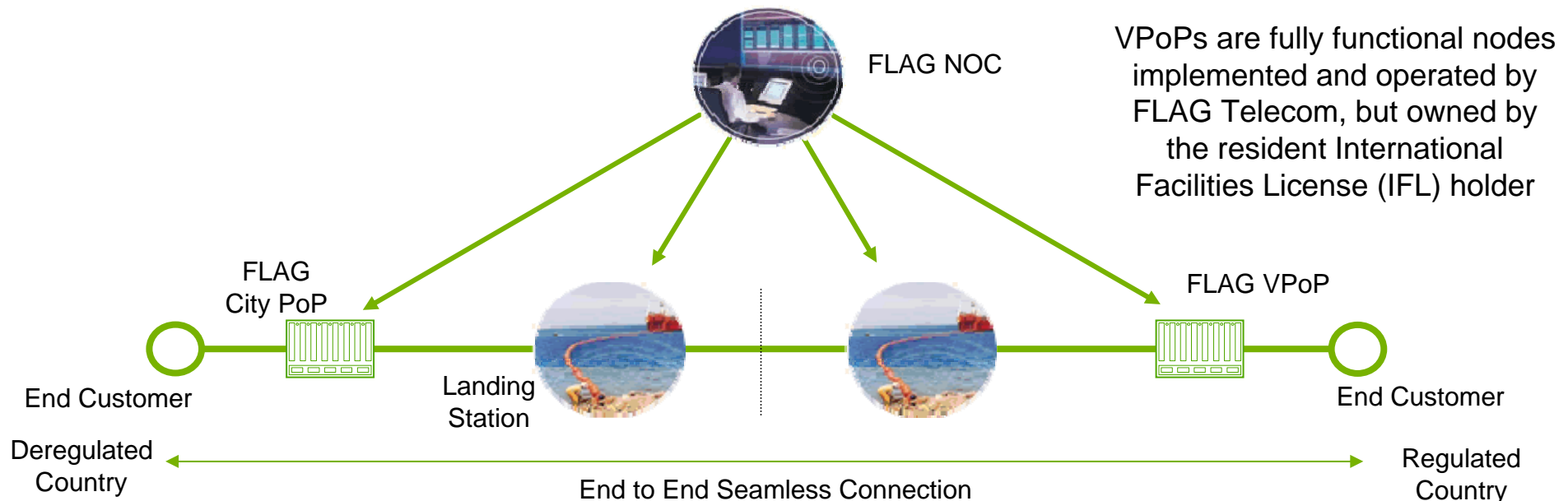
- ❧ FLAG employs leased line connectivity in other cities with more than one node (SDH / IP)
 - Amsterdam
 - Hong Kong
 - Singapore
 - Madrid

- ❧ Extended reach into all other locations is performed via FLAG's approved suppliers and partners worldwide



FLAG VPoP's

- FLAG has implemented virtual points of presence (VPoPs) to provide one-stop-shop access into tightly regulated countries
 - Fully interconnected into the FLAG Telecom global network



- FLAG VPoPs are implemented in Egypt, Pakistan and China



Global operations & service management

- ❑ Our global structure and network ownership enable us to offer effective and responsive service management
- ❑ Order Project Managers ensure timely and tested delivery of your service
- ❑ We operate a resilient, global Network Operations Centre (NOC)
 - NOCs are staffed by technical professionals, with specific expertise in subsea, transmission and IP network elements and technologies
- ❑ We employ highly skilled engineers and technical experts
 - We recruit at degree level and support staff include qualified & accredited engineers (CCNA, CCIE & JNCIE)
- ❑ Regional field engineers are on call 24*7 on a global basis
 - Coordinated by a central management function
 - Global Field Operations team has remote access to network management systems
- ❑ Strict escalation and customer communications procedures are in place
 - Focused on resolving faults and restoring your service quickly and efficiently, keeping you informed throughout



Network Operations and Management

- ❏ FLAG operates a primary NOC in Heathrow (UK), secondary NOC in Fujairah (UAE) and a Disaster Recovery NOC in London Docklands
- ❏ The NOC proactively monitors FLAG's network and facilities 24 hour-a-day, seven day-a-week
 - Monitors network elements, identifying alarms and performing root cause analysis
 - Monitors environmental alarms, including intrusion, high/low temperature, fire or smoke, toxic/explosive gas, DC/commercial AC power and water levels
- ❏ The NOC is supported by integrated operational support systems (OSS), optimally configured to detect & pinpoint faults to the individual network segment, handle incidents and quickly re-route traffic whenever necessary
 - Including Micromuse Netcool (high-level alarm fault isolation), Peregrine Service Centre / Trouble Management (trouble ticket system) & Cramer Dimension (circuit provisioning system)
- ❏ Centralised Operations (co-located with the FLAG NOC) are the control point for the network, logging and authorising all network activity
 - Responsible for repairing and restoring any customer circuit outages or any other events that happen on the network
- ❏ Field engineering / operations resources manage all localised repair and maintenance activities



FLAG transmission services

FLAG offers a range of bandwidth services to support the global connectivity requirements of our customers. Services are available at a wide range of speeds and with flexible contract terms. Optional co-location is available in major city centres

❧ FLAG Right of Use (RoU)

- A long-term contract providing the right to use capacity between specific points on the FLAG network

❧ FLAG Capacity Service

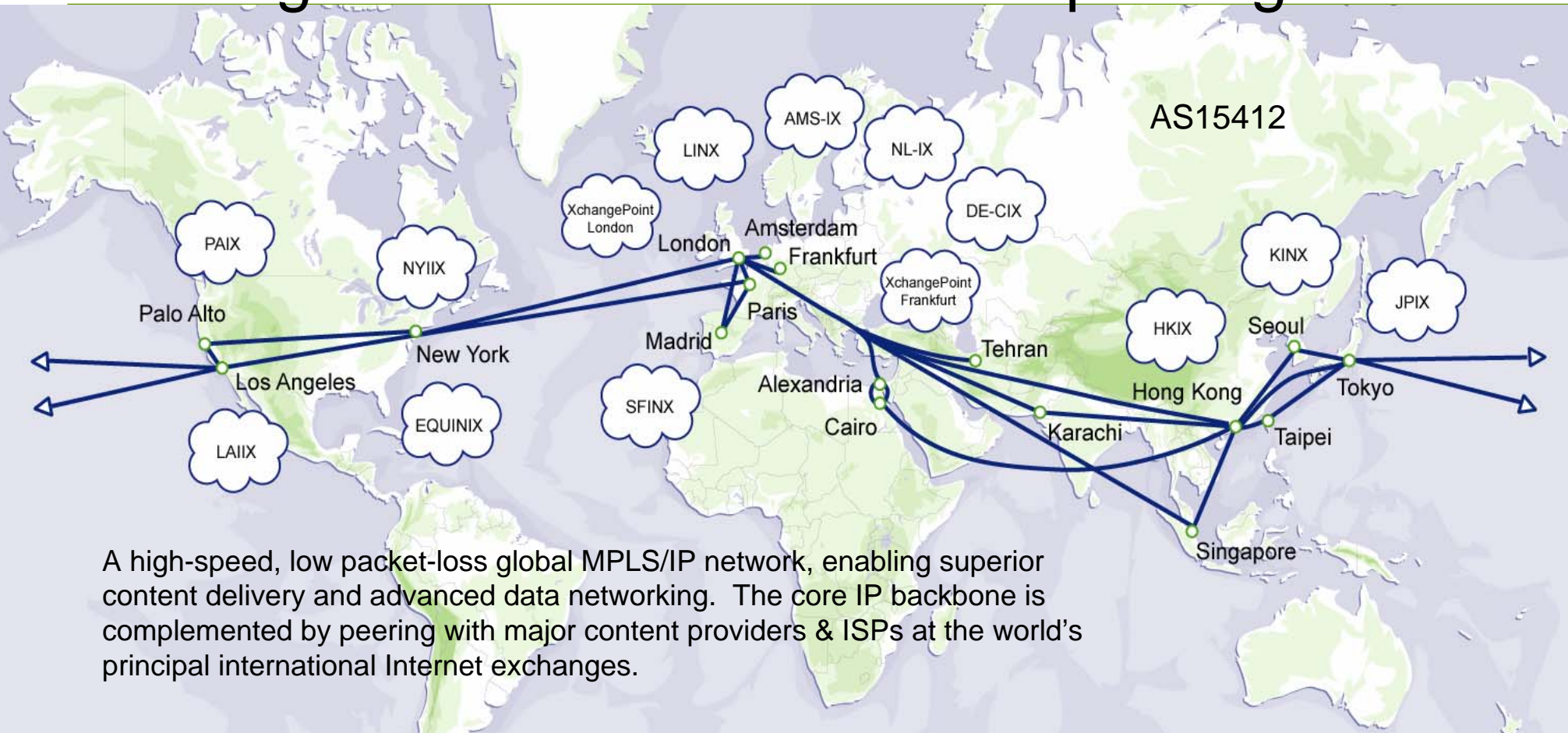
- Protection is not guaranteed
- Full or half circuit connectivity
- Between landing stations, city nodes or customer premises
- Targeted at major carriers that manage their own international facilities, back-up routes and restoration plans
- One-stop-shop service, facilitating all aspects of international delivery
- Supporting all customer traffic types and applications, including voice, video and data

❧ FLAG Managed Bandwidth Service (MBS)

- Protected, offering maximum performance and resilience
- Seamless, fully managed connectivity
- Between landing stations, city nodes or customer premises
- Targeted at major carriers that manage their own international facilities
- One-stop-shop service, facilitating all aspects of international delivery
- Supporting all customer traffic types and applications, including voice, video and data



FLAG global MPLS/IP network & peering



A high-speed, low packet-loss global MPLS/IP network, enabling superior content delivery and advanced data networking. The core IP backbone is complemented by peering with major content providers & ISPs at the world's principal international Internet exchanges.



Summary

- ❏ We own and manage the entire network, providing maximum control over service cost and quality
 - Network either self-constructed or acquired on IRU / long-term lease basis
- ❏ We have service operator licenses in key liberalised markets and maintain strong relationships with the incumbent telecoms operators in all locations in which we operate
- ❏ We offer extended reach as a standard option via city Points of Presence (PoPs), metro rings and local tails
 - Access to service is available from city centre locations, landing stations and customer premises
- ❏ Our network fully encircles the globe, enabling seamless traffic delivery both eastward and westward
 - FLAG strives to always provide customers with the most direct path between source and destination and are able to provide an on-net backup path
- ❏ High scalability enables us to provide a full range of data speeds
- ❏ An extensive range of measures are implemented to ensure maximum availability and minimum disruption to customers



Thank You

For further information, please visit www.flagtelecom.com for the contact details of your local FLAG Telecom representative

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