

# Application Note

## FDX2460 Central Office Applications

FDX2460 provides a solution for high density Ethernet transport in the Central Office

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### Overview

Fujitsu's FDX2460 is a wire speed, non-blocking, layer 2 switch with synchronisation and secure management. The FDX2460 provides a cost effective solution for Ethernet Aggregation in locations where space and power are limited. The FDX2460 supports 24 optical Gigabit Ethernet ports, 2 x 10 Gigabit XFP ports and 2 x 10 Gigabit SFP+ ports that can be deployed either as network or stacking ports. The FDX2460 can be supplied in DC or AC powered variants.

This application note describes the benefits the FDX2460 provides when deployed in central office environments and how it can be used to save significant costs in a number of network deployment scenarios.

### Blending Carrier and Enterprise Capabilities

A benefit of the FDX2460 is the blend of Carrier Ethernet and Enterprise Ethernet features that it supports. The FDX2460 can support a mix of provider bridging and point-to-point VLAN switching services, as well as consumer focused services such as multicast.

This allows the FDX2460 to provide cost effective aggregation for residential services whilst still supporting the transparent transport capabilities that are required for business services or simple port aggregation.

### Using the FDX2460 for High Density Port Aggregation at the Metro Edge

One of the challenges faced by today's networks is that customers are increasingly starting to move towards higher bandwidth services as 100 Mbps and 1 Gbps services become the norm for smaller business and even residential customers. This causes a potential issue at the metro edge of the network where a large number of fibres have to be cost effectively terminated and aggregated into 10 Gigabit interfaces for onward transport.

For large scale residential deployments many network operators turn to Passive Optical Network (PON) solutions because of this problem. The issue with PON solutions is that for business uses and even for some residential deployments Active Ethernet is a more flexible and attractive solution. However, this is only true if the cost and density issues at the metro edge can be solved.

The FDX2460 provides a cost effective solution for port aggregation at the metro edge because it has been specifically designed for environments where space and power are at a premium.

The FDX2460's small size (Height 41 mm, Width 448.5 mm, Depth 200 mm) means that it can be mounted in half depth ETSI racks and these can be placed back-to-back. This means that it is possible to achieve very high Fast Ethernet and Gigabit Ethernet port densities with efficient aggregation into 10 Gigabit Ethernet interfaces for transport into the core.

Physical size is only part of the story when it comes to achieving high port densities, power and rack mounting practice are also important and the FDX2460 performs very well in both of these areas. The FDX2460 has a maximum power consumption of only 70 W and crucially it can be mounted vertically in ETSI racks. This means that thermal management and fibre handling are much easier than for a horizontally mounted Ethernet switch and this allows for up to 1440 Gigabit Ethernet and 240 x 10 Gigabit Ethernet interfaces (all active) in a single 600 mm x 600 mm ETSI rack.

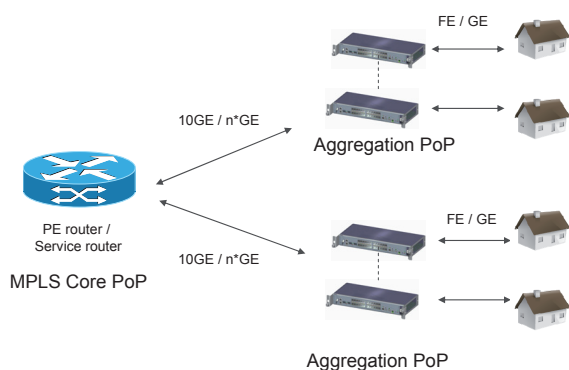
All of this adds up to significant savings in terms of space and power. When benchmarked against more traditional solutions, the FDX2460 achieved savings of over 40% in power and over 75% in space for a large scale Ethernet Private Line deployment. In addition to these savings, the FDX2460 solution also worked out to be significantly cheaper in pure equipment costs.

### Extending the Reach of MPLS Networks

Another application of the FDX2460 is to provide a cost effective solution for expanding the reach of MPLS core networks by providing a small footprint aggregation solution.

Many Carrier and Enterprise networks deploy large scale MPLS routers to support layer 3 and layer 2 VPN services to corporate clients. However, the cost of MPLS routers and the security risks of running an MPLS control plane can sometimes make it hard to justify expanding the MPLS networks footprint, even when transmission costs might otherwise justify it.

The FDX2460 provides an option for a low cost PoP which can aggregate Gigabit Ethernet customer interfaces into 10 Gigabit interfaces to be passed back to the larger MPLS core nodes. The small size of the FDX2460, and its secure management solution, permit these low cost PoPs to be located in small hostels in third party central offices (e.g. in a co-location hostel in a telco exchange). In order to reduce costs still further, the FDX2460 can use Single Fibre Working over the last 10 km to the customer saving on fibre usage.



### Extending the MPLS Core with Aggregation PoPs

The FDX2460 in this scenario is effectively providing a distributed MPLS UNI port expansion function, by using transparent Ethernet transport to virtualise the ports over the backhaul link to the MPLS core. Because the FDX2460 does not itself run the MPLS control plane, problems of scaling and convergence are minimised, and MPLS Fast reroute times are not compromised. In addition to this, keeping the MPLS control plane out of third party accommodation reduces the security risk to the core MPLS network.

Because security is important in these types of environment, the FDX2460 supports a number of key capabilities to make it suitable for deployment in hostels. For the management interface, this means the support of secure file transfer using SFTP and Radius authentication. For physical security this includes support for: IEEE 802.1X, enhanced digital interface diagnostics (to detect the installation of passive fibre taps) and mechanisms to lock down the management of FDX2460 for insecure environments.

### A Flexible Solution to Synchronisation

Carrier grade networks are increasingly looking to support synchronisation over Ethernet. This is driven by the desire to support mobile cell sites (for the new LTE based networks) and also legacy voice band data services delivered over IP. The FDX2460 supports both synchronous Ethernet and IEEE 1588v2 (packet timing). This means that deploying the FDX2460 will ensure that support for synchronous Ethernet is not compromised in the name of cost reduction.

The FDX2460 implements a highly accurate time stamping solution for PTP and this allows it to be used to plug gaps in the reach of Synchronous Ethernet within a network. For example; if the core network does not yet support synchronous Ethernet, the network operator can use Packet Timing over the core to the FDX2460 and the FDX2460 can use this reference to provide synchronous Ethernet interfaces to the customer premises.

### Conclusions

The FDX2460 can offer significant cost savings for port aggregation and for extending MPLS networks further towards the customer.

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