GÉANT

CUSTOMER EMPOWERED FIBRE (CEF) NETWORK BENEFITS

A serious disadvantage with pre-packaged fibre optical services from carriers is that they generally limit the end user to a particular protocol and speed. Lighting up dark fibre with their own equipment enables end users to run multiple protocols on the same fibre at whatever bandwidth is required. When the end user wants something different, their own engineering staff will reconfigure or change the equipment. There's no waiting around for carrier personnel because they themselves are the carrier.
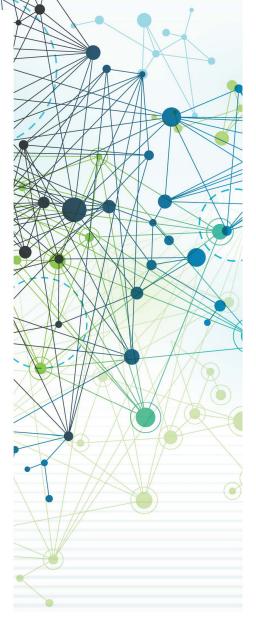
The **Customer Empowered Fibre (CEF)** network is a networking concept that is gradually changing network architecture, topology and services from the bottom of the hierarchy to the top. It increases control of dark fibre infrastructure, lighting it with chosen network technology and delivering the best possible services and features to end users with improved flexibility. The CEF network concept gives network managers the following benefits:

- More flexibility in network planning and deployment, including resource usage
- Ability to optimise the overall network resource utilisation
- Guaranteed network parameters such as bandwidth, delay, jitter and quality of service
- Option of using and deploying advanced photonics industry products
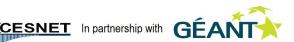- Potential for the network to become multi-vendor, with the best equipment available

Why Customer Empowered Fibre Networks?

One of the biggest recent breakthroughs in the design of NRENs has been caused by the transition from leased lines to dark fibres. This step has allowed NRENs to benefit from the same features as telecommunication operators, i.e. the carriers. NRENs are now able to provide their end users with more services at more reasonable costs. However, this step has also brought the necessity to own or lease transmission equipment. The NREN environment is rather different to that of traditional telecommunication networks, and the market is too small for vendors to offer special transmission equipment to meet the NRENs' specific needs. Nevertheless, some vendors have already started to discuss features such as software programmability and flexibility that are required by the research community. Better collaboration between the research community and commercial suppliers is therefore expected in the future. Although NRENs should be independent of business strategies and vendors' roadmaps, collaboration in network lighting and architecture may bring mutual benefits.

CUSTOMER EMPOWERED FIBRE (CEF) NETWORK BENEFITS | 2

Dark Fibre Solution Benefits

The dark fibre solution was once used exclusively by large telecommunication carriers who owned or leased optical fibres and "lit" them. The benefit to carriers was that they could utilise their own network lighting to turn up as much bandwidth, or as many end-user circuits, as necessary without upgrading their network infrastructure.

Today, the costs of dark fibre and of the associated equipment required to light it have become reasonably affordable and realisable.

In most cases, the cost of dark fibre is less than the cost of a pre-packaged fibre optic service. NRENs can realise the following benefits by utilising or creating a network with dark fibre infrastructure:

Cost
- Same monthly cost for 10 Gb/s or 100 Gb/s
- Bandwidth and service-level options can be upgraded up to the technology limit without increased cost

Flexibility
- Any service, any time
- Ability to upgrade equipment to improve the technology limits of the network
- Freedom to run any protocol and any service
- Ability to run multiple circuits over a single pair of fibres (Dense Wavelength-Division Multiplexing – DWDM)

Large and even medium-sized organisations, which include NRENs, can utilise dark fibre to profit from the same benefits and cost savings as the carriers. NRENs can therefore offer increased capacity and greater flexibility of their optical fibre infrastructure to the research and education community. Moreover, mainly thanks to NRENs, the research community can access dark fibres that are a rare resource and that facilitate advanced technology and research experiments.

Control
- Upgrade at any time, without waiting for the carrier
- NRENs can schedule their own service and maintenance windows
- The NREN decides what bandwidth and what applications to run
- Burst above average utilisation levels without any additional costs
- Control of the fibre infrastructure gives control of the level of service

Scalability
- The technology of the NREN's equipment determines how much bandwidth they have
- Ability to upgrade from 1 Gb/s over 10 Gb/s to 40 Gb/s or 100 Gb/s by changing the optical cards in the equipment

CONNECT | COMMUNICATE | COLLABORATE

www.geant.net