

A next-generation fibre access deployment for the HEAnet network

It is well understood that current cable and xDSL techniques will not be able to cope with the growing traffic demand prompted by a multitude of new online content sharing applications. Data rates for HD video applications run in excess of 10 Mbps per channel, while novel real-time services such as thin client computing require peak bandwidth of tens of Mbps to deliver satisfactory quality of experience. However xDSL techniques are only able to deliver peak bandwidth of 20-30 Mbps, and are highly asymmetric. Fibre To The Premises (FTTP) on the other hand is the only solution capable of providing the scalable access bandwidth required for the foreseeable future. The mass deployment of fibre access networks we are currently experiencing is probably the most important network upgrade strategy for operators over the coming decade. Next generation networks and in particular the Long-Reach Passive Optical Network (LR-PON) solution aim to increase long term economic viability and sustainability of Fibre to the premises (FTTP) deployment. The LR-PON solution achieves this by minimising the number of nodes and the amount of electronic equipment required within the network. Compared to the existing Gigabit PON (GPON) standard, LR-PON increases the number of user per cell from 32 to 512 and potentially 1024; it increases the optical reach from 20 km to over 100km; it bings the data rate from 2.5 Gbps to 10 Gbps, both upstream and downstream.

An important aspect of the LR-PON evolution is that it is particularly suitable to offer highly resilient, dual-homed protection. Case studies carried out over the Eircom national network show that a LR-PON deployment could eliminate all electronic switching from the over 1100 central offices, replacing them with less than 20 metro nodes, while offering at the same time extensive dual-homing protection. The work we have carried out at CTVR includes the development of a mechanism that reduces the amount of IP over-provisioning and its associated protection costs. For the Eircom network for example, IP over-provisioning can be reduced by well over 40%, bringing a potential cost reduction of up to 30% compared with legacy 1+1 IP protection.

We at Trinity College are currently carrying out a joint project together with the HEAnet network development team and the Cork Constraint Computation Centre team at UCC, on a case study for a potential LR-PON implementation in the HEAnet network. Our preliminary investigations suggests that delivering FTTP to HEAnet customers could be achieved with less than 10 nodes. This could bring considerable reduction in power consumption and costs (both capital and operational).

Our final aim is to investigate the possibility of a HEAnet-based LR-PON deployment that could bring FTTP (i.e., multi-gigabit connections) to all education facilities in Ireland (primary, secondary and third level) along with all public and government buildings (including the health system).