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Optimising fibre optics to save cost

By Rozana Sani

THE push for a nationwide high-speed broadband services across the country by the Government is expected to help more, if not all, citizens get internet connectivity and gain all the benefits that come with it.

To make this happen, there is a need to implement the infrastructure needed and this essentially involves investing in laying a fibre-optic network.

While some may argue that there are already existing installed fibre-optic cables in place, it is safe to say that the existing cables have been used up to connect various stations and customers. Any new requirements will need new fibres to be installed.

However, installing new fibre cables comes with a number of challenges – it requires approval from authorities like the City Hall for right of way to dig up trenches to lay the cables, interrupting traffic flow, and generally taking a long time to complete using a lot of manpower. This is all translated into high cost and delayed service provisioning.

Local company Significant Technologies Sdn Bhd (SigTech) believes it has the solution that can provide a way to increase the utilisation of the existing fibre optics installed, in a way that the capacity can be doubled at a very minimal cost.

Its invention, the Optical Fibre Channel Doubler (OFCD), allows for immediate doubling of cable utilisation without trench digging, right of way, and traffic disruption.

It can be installed within minutes and it does not require any power supply to operate.

operate, said executive director Najman Kamanudin.

DEVELOPING THE PRODUCT. According to Najman, the idea for OFCD was first conceived and later developed at Photonics and Fibre Optic Systems Laboratory, Faculty of Engineering, Universiti Putra Malaysia (UPM) in early 2000.

"The idea of using bi-directional transmission (transmit and receive in the same fibre optic) was generally rejected due to some detrimental effects of back-reflections. However, the use of optical circulation concept by adopting optical circulators, and/or isolators, together with fusion couplers can be adopted and designed so that the reflection is minimised, and the bad effects reduced," he shared with *Tech&U*.

The thorough studies, producing two Master's of Science degree holders, were pursued by Professor Dr Mahamad Khazani Abdullah and his team at the laboratory and in the fields were proven successful.

While the study itself took less than two years, Najman said the process of convincing the end users, mainly telecommunications service providers such as Telekom Malaysia, Maxis, etc, took longer.

"One of the main reasons in the delayed acceptance by the industry may have to do with the fact that the solution was not ready in the form of commercial packaging. The lack of policy and incentives for the local telcos to use locally developed products is another important reason," he said.

As part of the commercialisation strategy of UPM, a collaboration with SigTech was initiated.

SigTech further transformed the solution into commercial prototypes and

started to market them to the industries more aggressively. Various trials locally and overseas (in Indonesia and Saudi Arabia) have been successfully carried out.

Together with SigTech, the product design has been extended further to include some important monitoring features.

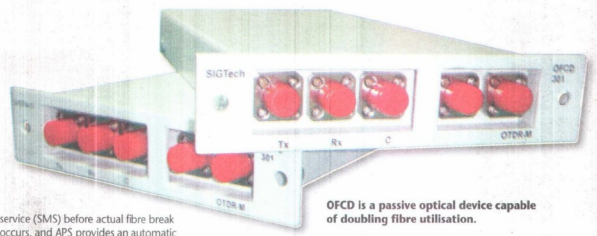
"Our product is the only one in the market that offers Transmit and Receive power monitoring ports, as well as Optical Time Domain Reflectometry (OTDR) testing port, as options. Previously, the system has to be turned off (thus interrupting the services) in order to perform signal monitoring and testing. With these features, telcos' engineers are now able to perform the vital tests while the data are transmitted alive."

WHAT NEXT? The next plan is in enhancing the product further to support Fibre To The Home (FTTH) networks as a new emerging system technology.

"FTTH is the ultimate solution for future-proof broadband applications directly to the customers at homes or offices. This new technology has several standards, including a popular uni-directional transmission-based solution. With OFCD, the number of customers can be doubled at minimal cost, resulting in much less cost per user."

"We have also developed OFCD to function in conjunction with our other products, such as Fibre Break Monitoring System (FMAS) and Automatic Protection Switch (APS), as a total fibre-optic protection solution with capacity doubling, at a very affordable cost," Najman said.

While OFCD doubles the capacity, FMAS provides vital fibre-optic health condition and an automatic warning to technicians/engineers via short message



OFCD is a passive optical device capable of doubling fibre utilisation.

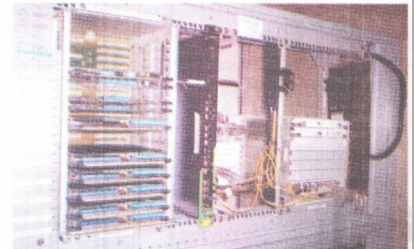
service (SMS) before actual fibre break occurs, and APS provides an automatic protection via redundancy routing when the fibre breaks. Thus, users will be enjoying the services continuously without any interruptions.

Najman believes the market potential for OFCD is huge as the cost savings offered by OFCD is irresistible.

"Our OFCD has been successfully deployed at major telcos such as TM, Celcom and Maxis. We anticipate these major telcos would continue deploying the OFCD in view of the high utilisation of fibre-optic cables, especially in the metro area."

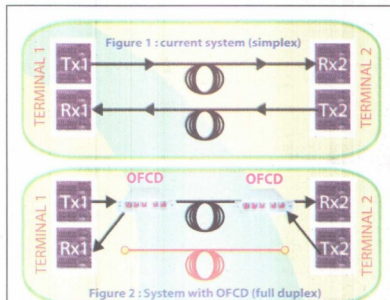
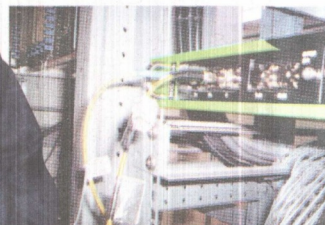
"We have also successfully carried out trials at Saudi Telcom in Riyadh, Saudi Arabia. Saudi Telcom was impressed with the capability of the OFCD and we expect to install the OFCD in Saudi Arabia by the middle of this year. Similarly, we also making inroads into Indonesia through the biggest telecommunications company there, PT Telkom," he explained.

As Malaysia is embarking to establish FTTH networks throughout the country, SigTech sees the opportunities for products such as OFCD, FMAS and APS to be part of the local solutions.



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Khazani and his team took about two years to conduct laboratory test on the idea of using bi-directional transmission.



HOW IT WORKS.

OFCD works by allowing the transmission of data in two directions simultaneously in the same fibre optic. This mode of transmission is known as bi-directional transmission as opposed to uni-directional transmission as in the conventional systems.

In uni-directional transmissions, data are transmitted in one fibre in one direction, and are received in another fibre separately in the opposite direction. (As shown in Figure 1.) Thus, conventionally, two fibre

optics are required connecting between two points, A and B, whereas only one fibre is required using SigTech's OFCD.

The splitting and combining of signals are performed by OFCD by use of optical circulation and isolation techniques. The circulation and isolation are achieved by manipulating the polarisation of light inside the OFCD (as shown in Figure 2).

The OTDR monitoring is made possible by allowing the product to transmit signals at two different wavelengths.