

## **Interconnecting LAN Switches with Dark Fiber and GBICs**

designing a cost-effective network between  
two buildings using fiber and a Gigabit  
Interface Converter (GBIC)

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## 1 Introduction

This document shows how a network connecting two buildings can be designed cost-effectively. The proposed solution consists of only two elements: the fiber connection and a Gigabit Interface Converter (GBIC). This backbone network can be used to interconnect two Gigabit Ethernet switches.

## 2 The Problem

### *Connecting Ethernet switches in different buildings*

Some companies may want to interconnect two Ethernet switches located in two separate buildings within or across a Metropolitan Area Network (MAN) in a cost-effective way with a high speed circuit.

Connecting different locations to each other can be achieved through leasing traditional local loop. However these circuits are not easy to upgrade, lack granularity, do not always have the right interfaces and can be quite expensive for higher speeds. Customers generally have the following requirements:

#### *No bandwidth limitation:*

The customer does not want to be bound by bandwidth constraints, and does not want to go and get approval for extra budget each time he want to upgrade his bandwidth, etc.

#### *Ease/Freedom to upgrade:*

If the customer wants to change his interface, or bandwidth, he does not want to wait several months for his upgrade.

#### *Transparency, technology control, security control against interruptions:*

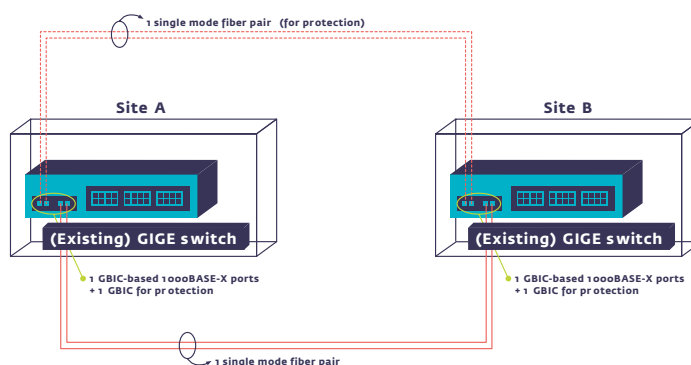
The customer wants to fully determine, understand and control his network design. He wants to understand all the strengths and shortcomings of the implemented technology: redundancy, single points of failure, protection mechanisms, latency, etc.

#### *Security against third parties:*

The customer full control of his traffic: he does not want anybody to be able to monitor or interrupt his traffic without his permission.

***All without extra cost, extra work in terms of network management, or extra complexity.***

### 3 The Solution



*Typical GigE link using GBICs*

#### 3.1 How it Works

##### *The fiber connection:*

To connect two or more buildings, long distances need to be spanned and in most cases this can only be done with fiber. Eurofiber provides the fiber connection end-to-end.

##### *The Gigabit Interface Converter (GBIC) card:*

The signal generated by the customer equipment in Building A, needs to reach building B. Therefore a GBIC is needed to convert the electrical Gigabit Ethernet signal to an optical signal that can be transported over single mode fiber. GBIC interfaces make speeds possible over the fiber of 1 Gbps. 10 Gbps interfaces are also available (XENPAK or XFP). Medium-reach (10km) as well as long-reach (70km) are available with extended reach.

The GBIC can be seen as a module that can be plugged into existing switches, whenever the customer wants to upgrade his backbone link.

##### *Restoration:*

Restoration or fail-over from 1 link to the other link has to be performed by the (existing) switch. It has therefore to be configured by the customer.

##### *Network Management:*

The MAN circuit can be considered as a LAN link: it just happens to span a longer distance than a usual LAN link. Therefore no extra management is needed at the equipment level.

## 4 Conclusion

If the customer wants to interconnect 2 sites, when he has 2 Gigabit Ethernet switches available at both sites, and high bandwidth requirements, then he can do so cost-efficiently by acquiring a dark fiber link (or ring) and 1 (or 2) GBICs per site and plugging these into his existing switches. A fiber-based solution has the following advantages:

- Virtually unlimited bandwidth (only restricted by his GBIC card) available: the bandwidth is only limited by the used GBIC.
- Freedom to upgrade his bandwidth, and therefore his GBIC interface whenever he wants, without having to upgrade the backbone, i.e. the fiber infrastructure.
- A transparent solution with redundancy, if required.
- Security against third parties: the only way for a third party to interrupt or monitor the traffic would be by cutting the fiber, and putting equipment in the gap: this cannot easily be done without being noticed both by the customer and Eurofiber.
- Limited extra costs in terms of equipment expenditure (GBICs), no extra cost in terms of extra network management.

### **About Eurofiber**

Eurofiber is a specialized provider of Managed Dark Fiber connectivity and Ethernet-services from 10 Mbps until 10 Gbps. The Eurofiber-network now covers more than 8.000 km and grows continuously. More than 25% of all internet traffic and 50% of all mobile communication traffic in The Netherlands is transported via Eurofibers fiber optic network.

Eurofiber stands for freedom to choose and headroom to grow. That affords organizations the freedom to decide themselves how to use the connections and to choose their own service providers. Our finely meshed network, the broad product range and the possibility to increase the bandwidth at any moment, gives organizations the headroom to grow and benefit from new ways of working.

### **Further information**

Feedback/queries relating to the White Paper: [info@eurofiber.com](mailto:info@eurofiber.com).  
Presentations: Eurofiber is happy to give a more detailed presentation on this topic. Email the above address or telephone the marketing communications department at +31 (0)30 242 87 00. General information about Eurofiber: visit [www.eurofiber.com](http://www.eurofiber.com)