APPLICATION NOTE

Wireless Division

Metrodata & Standard Conversion Services –

Converting between Wireless Equipment Interfaces and Customer Premises Equipment Interfaces

Introduction to Metrodata Wireless Division

The Traditional market for Metrodata products has been in the leased line area, providing conversion technologies from Terrestrial Wide area Technologies to customer type interfaces such as X.21, V.35 and High Speed Serial Interfaces (HSSI) on Routers, Video, Voice and Data products. These services have been delivered by carrier organisations on copper, coaxial and fibre optic cables.

With the increase of bandwidth required by users it has become more and more difficult to provision cable services to these locations. This might be difficulty in laying new cables, digging up roads etc or even just the time required to lay cables.

Laser, Microwave, Radio, and optical systems are becoming more widely used to provision these services. These ensure quick and reliable connections of the last mile to customer premises. We class this whole range of services as "Wireless".

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What are the Issues in Wireless?

This however still gives a lot of connectivity issues in connecting these to terrestrial services for long distance transmission. Traditionally these last mile solutions will be connected to carrier networks using high-speed backbones of cable and fiber optics. Metrodata are heavily involved in producing connectivity solutions to connect these Last Mile "Wireless" services to High-Speed carrier backbone services.

Basically the "Wireless" system can be considered as a high-speed point to point link and the full range of Metrodata products for leased line connectivity can be used to connect customer premises equipment to the "Wireless" System.

A lot of "Wireless" manufacturers produce customer premises interfaces but in a lot of cases they might not have the specific speed or interface required by the client.

Metrodata are a UK Manufacturer of interface converters from N x 64, E1, E2, E3 and DS3 to standard X.21, V.35 and HSSI customer interfaces. Also provided where applicable is speed conversion.

Currently we categorize our Wireless Applications into the following 7 categories:-

- Standard Conversion Services
- Speed Conversion
- ATM Connectivity
- Circuit Emulation
- Concentration
- Carrier to Carrier Applications
- Point to Multi-point

In this Application Note we are focusing on Standard Conversion Services. Application Notes are available on all these categories from our website www.metrodata.co.uk/bwn or by emailing the BWN team (contact details listed at the end of the note)

Standard Conversion Services

A number of "Wireless" products have standard wide area networking interfaces supporting European or American standards. Typically these are in the Microwave Radio sector, where the use of "Wireless" was typically for adding cost-effective Carrier Infrastructure by replacing leased lines or circuits. Also, traditional ground based infrastructure cannot always be provided to every location and so "Wireless" was used to extend the leased line infrastructure. Because of this relationship with circuits (and circuit speeds), the most widely used interface is G.703 and the speeds or data rates tend to be E1 (2.048Mbits), E2 (8.448Mbits), E3 (34.368Mbits) and DS-3 (44.736Mbits). These are all ITU-T Standard Telecoms Rates.

The different service delivery solutions that we are focusing on in this Application Note are:

- Connecting E1 G.703 Output to a Router Serial Interface
- Connecting Multiple E1 G.703 Outputs to a Router
- Connecting E2 8.448Mbps G.703 Outputs to CPE
- Connecting G.703 Microwave to an Ethernet Device
- Cost Reducing Microwave Systems using the Cisco 3600 and Metrodata DC3445

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Connecting E1 G.703 Output to a Router Serial Interface

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The cost benefits of using a Converter to connect a E1 G.703/RJ45 output from a Leased Line, to a Serial Interface on a Router are well known. Typically the combination of a Converter and Serial Router Module is substantially less than an E1 Router Module (and no Converter).

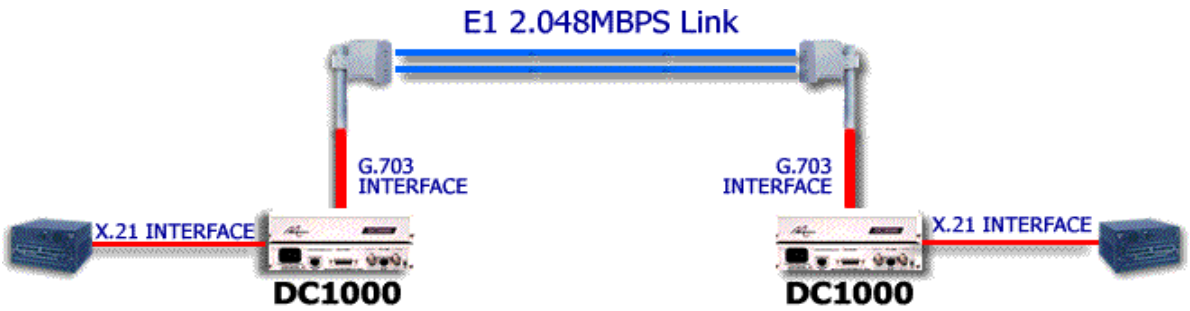
The fact that in this scenario we are using Microwave Radio or Wireless equipment is irrelevant. The cost benefit is still there. Many of the G.703 to X.21/V.35 Converters that are available now have not been designed with the Wireless Market in mind.

In 1998 Metrodata developed a low cost G.703 to X.21 Converter called the DC1000. This was initially aimed at the ISP Market, however subsequent trials of the DC1000 with BT Radio Solutions showed that the DC1000 was ideal for the Microwave sector.

With the DC1000 in mind for the UK Emergency Services Network (Police, Fire, Ambulance), Metrodata were asked by BT to increase the reliability of the DC1000 to 100 years MTBF (Mean Time Between Failure). We achieved this, and now have one of the most reliable cost-effective E1 DSU's in the world.

The addition of this increased reliability to a standard product gives the end-user piece of mind in building a Wireless network around the DC1000.

The DC1000 is a G.703/RJ45 to X.21 Converter that works at E1 or 2.048Mbps. Also available is a V.35 version (DC1200), Fractional E1 Versions for X.21 (DC3000) and V.35 (DC3200).



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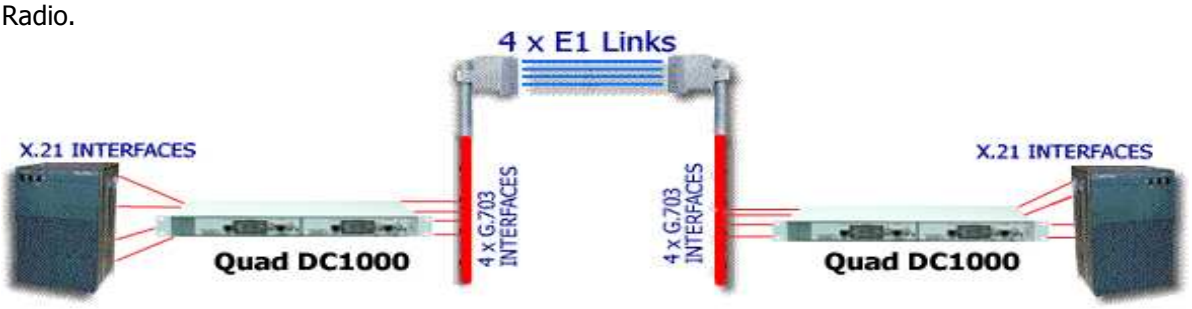
Connecting Multiple E1 G.703 Outputs to a Router

Where the Microwave Radio outputs are between 2 and 16, it is possible to "bind" these separate E1 Circuits together using the DC1000, and a Router using Multi-link PPP.

In order to cost-effectively do this you need to convert the G.703 output to a X.21 Serial Router Interface. This will then allow you to use a Router with a Quad Port Serial Interface. You should check with the Router Manufacturer, but generally these interfaces support up to 8Mbps (either spread across the 4 Ports or on a single port).

The number of Multi-link PPP connections you can make in a single Router depends upon the Router Manufacturer and Router Series. Most low-end routers would support up to 4 x Multi-link connections. The medium/high-end routers would support more than 4 (Check the exact Multi-link PPP capacity with your Router supplier).

The Metrodata DC1000 can be rack-mounted in a Chassis holding up to 18 separate units. This allows easy and cost effective building of a complete system including Router and Microwave Radio.



Connecting E2 8.448Mbps G.703 Outputs to CPE

Where the Microwave Radio is presenting a single G.703 output at 8.448Mbps or E2, there is generally a requirement to convert to a more usable serial interface. Most Router Manufacturers do not have an E2 interface instead using HSSI, or even in some cases X.21. With the Metrodata FM4800 it is possible to convert the G.703 output into an X.21 serial interface. Typically this could be used with either a fixed port Router (capable of 8.448Mbps), or a Modular router with Quad X.21 Interface (capable of 8.448Mbps). With these Quad Interface's it is possible to utilize the full capacity of the Interface through a single port (dependent on Manufacturer).
The issue with using X.21 is that it is not particularly scalable. If there is a chance that you might upgrade your E2 Microwave Link to a higher speed, then it is worth using the HSSI interface in the Router. HSSI is a scalable speed interface that can run up to 51.84Mbps or STS-1. If you need to convert E2 8.448Mbps G.703 to HSSI then the Metrodata product required is the FM4850.
It is also possible to connect other interfaces such as E3 and DS-3 to an E2 G.703 Microwave Radio output, though this is covered in a separate Application Note.

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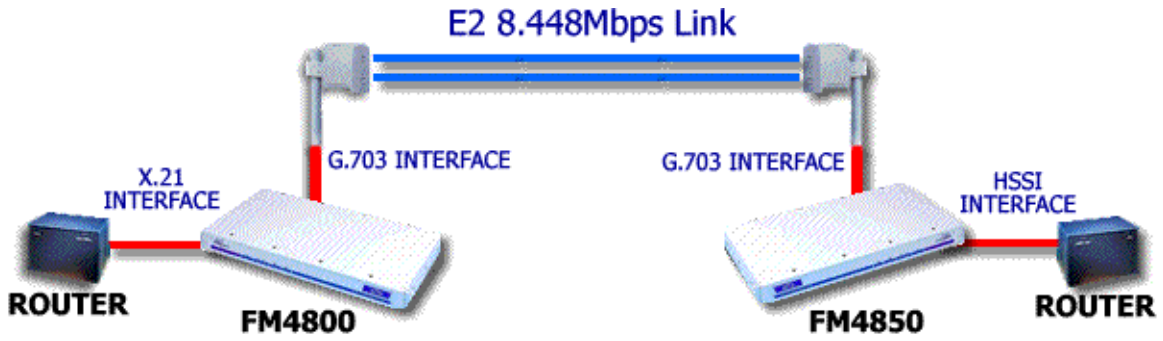

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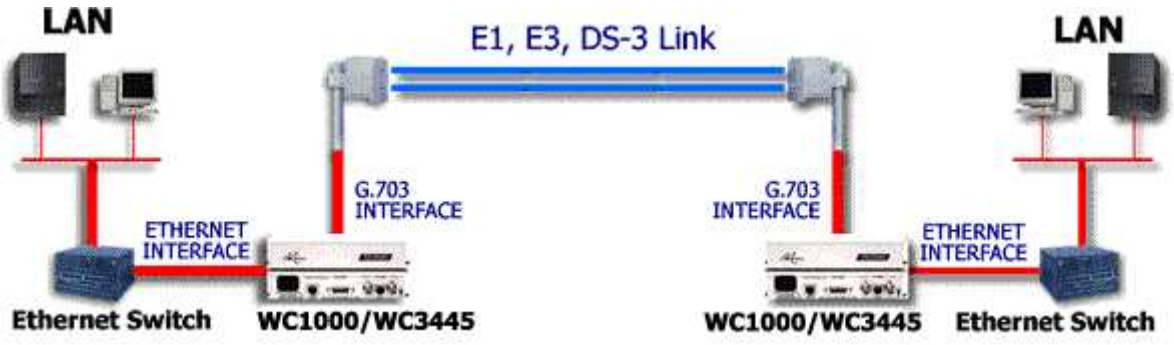
Connecting G.703 Microwave to an Ethernet Device

The benefits of Microwave Radio are mainly cost related, and as such the equipment used to connect the Microwave Link to a Router, Switch or Carrier Equipment need to be reliable, low cost and easy to install.

Most Microwave applications involve HSSI on the Router and a G.703/HSSI Converter. However, if you already have spare Ethernet ports on your Router or LAN Switch it might prove more cost effective to use them, rather than purchase a separate HSSI card (If you've already got a HSSI card, then it may prove beneficial to look at the following application).

The Metrodata Wan in a Can range of Network Extender's, provides a simple "plug and play" point to point LAN extension service. The WC range offers the ability to extend a 10/100BaseT LAN over a Microwave Radio connection operating at n*64k, E1, E3/DS3 or 155Mb speeds. The WC's operate in pairs, providing a type of "Subscriber/Provider" solution.

In this application, the Network Extenders used are the WC3445, which operate at 34.368Mbps. Also available are 2.048Mbps version (WC1000), a 44.736Mbps version (WC3445), a n*64Kbps version (WC.V35 or X21) and an STM-1 version (WC155). The 'subscriber' unit is installed at the remote office and filters all unwanted local traffic, only forwarding traffic destined for the corporate LAN. At the central site, the LAN switch provides the required filtering only forwarding traffic destined for the remote office unit.



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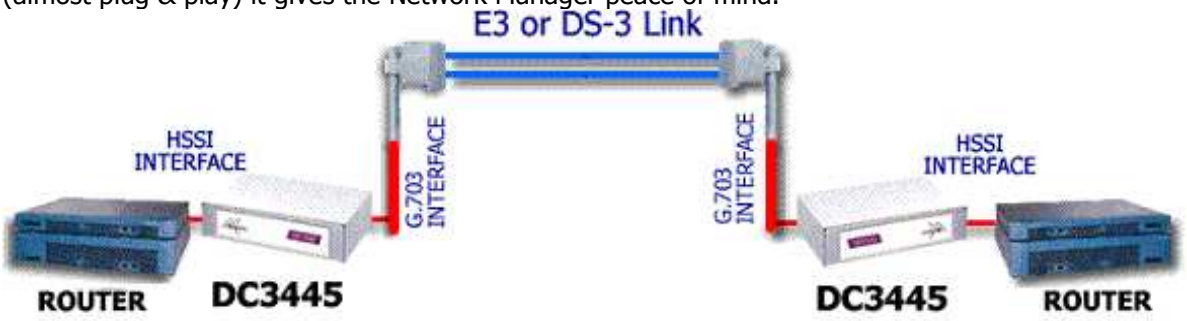
Cost Reducing Microwave Systems using a low end Router and the Metrodata DC3445

When using an E3 34.368Mbps or DS-3 44.736Mbps Microwave System, it is important to consider the throughput of the Router being used. The most cost-effective Router that can handle these would be a modular router that comes in a variety of different Chassis Sizes.

Once again Metrodata can provide a product to interface the G.703 from the Microwave Radio to the HSSI Interface. Because the Microwave Link is in most cases self supported, having full SNMP Management on the G.703/HSSI Converter was not a requirement. Previously Clients had been using the Metrodata FM4900 (E3) and FM4950 (DS-3) to interface their Microwave Radio. We decided to strip down the functionality of these devices, and reduce the cost. Then we decided to provide support of both E3 and DS-3 speeds in one unit. This is the DC3445.

Specifically designed for use with Microwave Radio Systems it allows Systems to be designed supporting both E3 and DS-3 speeds, whilst standardizing interface conversion on one unit: the DC3445. This makes the support of the System easier, and combined with the ease of installation (almost plug & play) it gives the Network Manager peace of mind.



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Contact Details

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