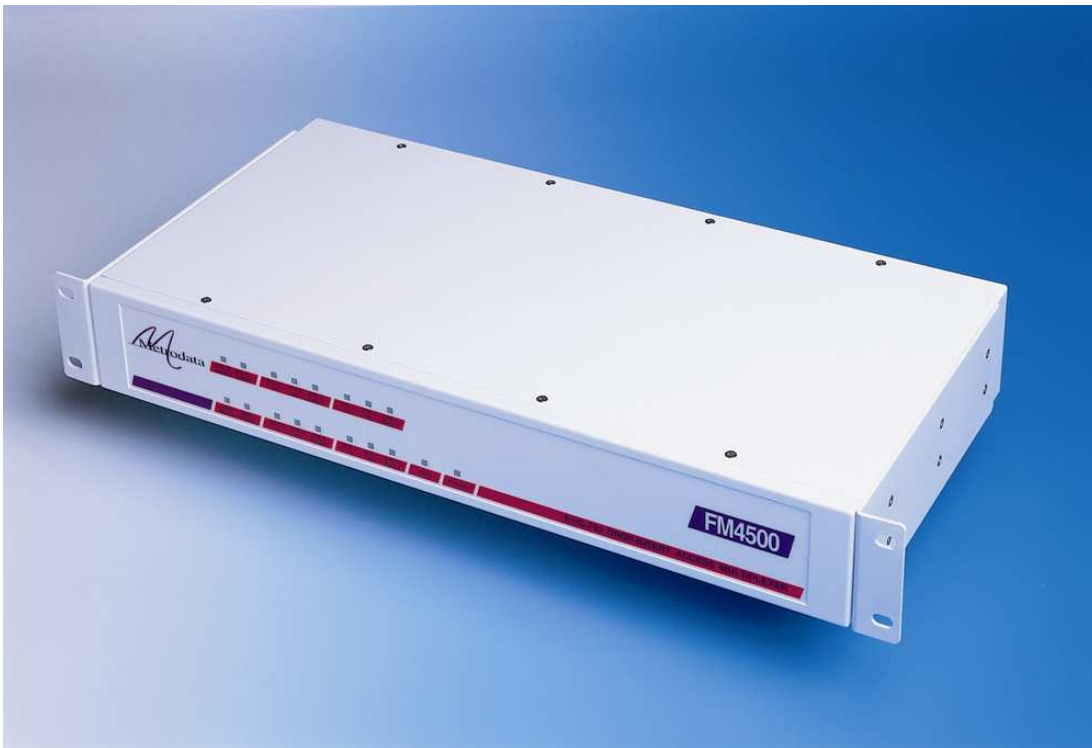


# APPLICATION NOTE

## Metrodata's FM4500 and FM4200

### The Integrated Service Provision NTU's



Carrier Division



## New Integrated Service Requirements

There is an increasing requirement for corporations to integrate their communication services into seamless networks. Where there is a requirement for voice links, there will be a requirement for data links. Although traditionally these services were the responsibility of different departments, a more modern tendency is to take a holistic view of communication requirements with the aim of reducing telecommunication costs, integrating the management of the networks, and improving levels of service.

The service provider who aims to satisfy these requirements will need to provide as CPE an NTU which can offer voice and data connectivity across the local service provision link. In practice this will take the form of a suitable multiplexer attached to a leased line, usually of fractional E1 or E1 levels of service.

## The New Integrated Services Multiplexer

The Metrodata FM4200 & FM4500 is a carrier-class, voice-and-data, time-division multiplexer, which is ideal in the role of Integrated Service Provision NTU.

- FM4200 has three ports: a G.703 port for connection to the E1 leased line, a G.703 port for connection to a PBX, and an X.21 or V.35 data port for connecting a router, bridge, cluster controller or other DTE. Alternatively it could be connected to a video Codec.
- FM4500 has five ports: a G.703 port for connection to the E1 leased line, a G.703 port for connection to a PBX, and four X.21 or V.35 data port for connecting a router, bridge, cluster controller or other DTE. Alternatively it could be connected to a video Codec.

The Metrodata FM4200 or FM4500 can be configured (locally or remotely) so as to allocate bandwidth as required to the different ports, be they for voice, data or leased line. This configuration can be changed at any time by means of a simple terminal session, either to meet the customer's differing bandwidth allocation requirements for voice and data, or alternatively to vary the amount of total bandwidth supplied by the service provider. Any such configuration can be done remotely with no need for a site visit, thereby greatly reducing running costs to the service provider and inconvenience and delays to the users.

Both Multiplexers are equipped with Metrodata's Enhanced Line Performance Monitoring, which allows the user to monitor all attached lines and connections, as well as performing appropriate tests.

As an option the Metrodata FM4200 and FM4500 can also be equipped with a Metrodata LM1100 SNMP Management Module. This allows the unit *and all attached lines and connections* to be integrated seamlessly into the user's SNMP management system.



As an NTU it offers service providers and their customers the following benefits:

- Combination of voice and data on the same E1 or fE1 leased line.
- Total flexibility of allocation of bandwidth to PBX and data ports.
- Complete variability of service bandwidth provision up to 2 Mbps.
- Clean separation of services with fixed bandwidth allocation.
- Ability to extend connection to router at remote site via X.21 or V.35 fractional E1 leased line.
- Remote Configurability of unit, thereby obviating site visits.
- Ability to manage unit and monitor leased line and connections to customer equipment, locally or remotely.
- Incorporates alarm extension relays.
- Fits 19-inch rack.
- Option of -48 volt DC power supply.

## A Solution for Today's Corporate Connectivity Requirements

The Metrodata FM4200/FM4500 gives service providers an ideal solution for customers' integrated service connectivity requirements. Its combination of flexibility and manageability makes it uniquely appropriate to a service provider as an NTU, and as a means of offering a service to satisfy users' requirements today and in the foreseeable future.

### Applications for the Metrodata FM4200/FM4500

The Metrodata FM4500/FM4200 is endowed with great flexibility both in terms of how and where it allocates bandwidth, and in the diversity of services it supports. This naturally opens up a wide range of opportunities for its application. Here is but a sample of the more obvious ones:

#### Service multiplexer for single customer

One obvious application and probably its most common are as a multiplexer delivering voice and data across an E1 link. E1 leased lines usually carry a high rent; they are also almost never used to full capacity the whole time, so it makes sense to use them to carry voice as well as data traffic, thereby cutting down on telephone bills.

This principle can be extended to other services/media. For instance video conferencing and data services such as Frame Relay and X.25 can be allocated their own channels (see fig. 1 overleaf).



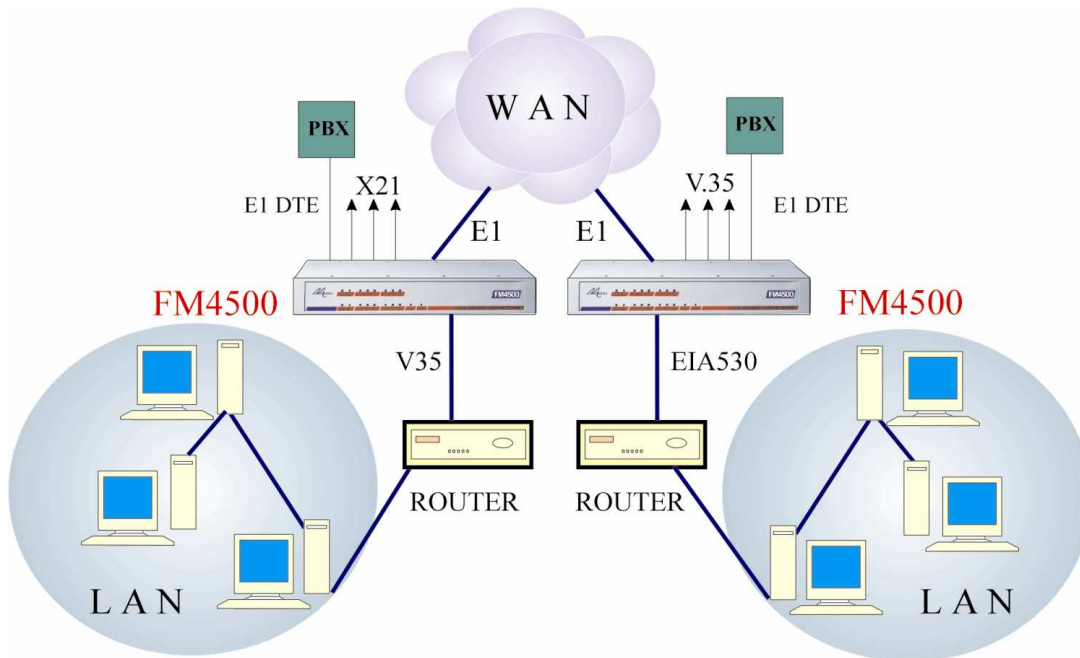


Figure 1: Typical use for the FM4500

Once an enterprise has decided to install an E1-based infrastructure, the installation of Metrodata FM4500s multiplexers allows the users to:

- Maximise the cost-effectiveness of bandwidth usage by allocating spare bandwidth to a variety of services.
- Allocate bandwidth as required to continuously varying communication service requirements.
- Future-proof the installation by allowing for bandwidth allocation in the future as differing user needs evolve.
- Integrate a variety of communication services in a budgeted, fixed cost infrastructure.

## Service Multiplexer for Multiple Customers

Many customers require wide-area connectivity, but are unwilling to pay for the cost of a dedicated E1 line. Where a number of such customers are located on the same site, or in close proximity, it is often more efficient for a carrier to be able to deliver bandwidth via E1 leased lines, and then split the bandwidth as desired between the different users.

This can now be done efficiently by installing a Metrodata FM4500 as Customer Location Equipment. With an E1 (or  $n \times 64\text{Kbps}$ ) input, bandwidth can be allocated as desired in 64Kbps increments to the four data ports as required. The output as seen by the customer is therefore an X.21, V.35 or EIA530 port to which can be attached a router, bridge or communications controller. In addition Frame Relay or X.25 services could be offered via the appropriate access device (such as a router with Frame Relay interface software). See fig. 2.

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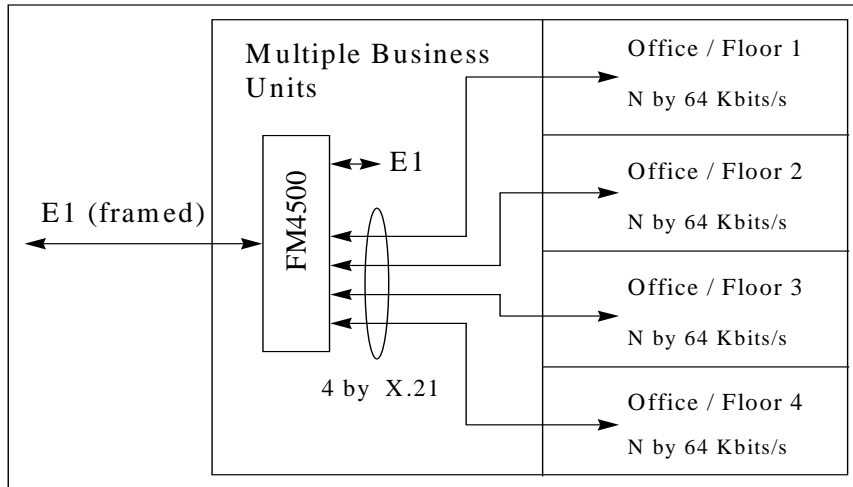


Figure 2: FM4500 providing X.21 access to Multiple Business units

Instead of just supplying local offices, the X.21 ports can be connected to remote offices via 64Kbps digital leased lines.

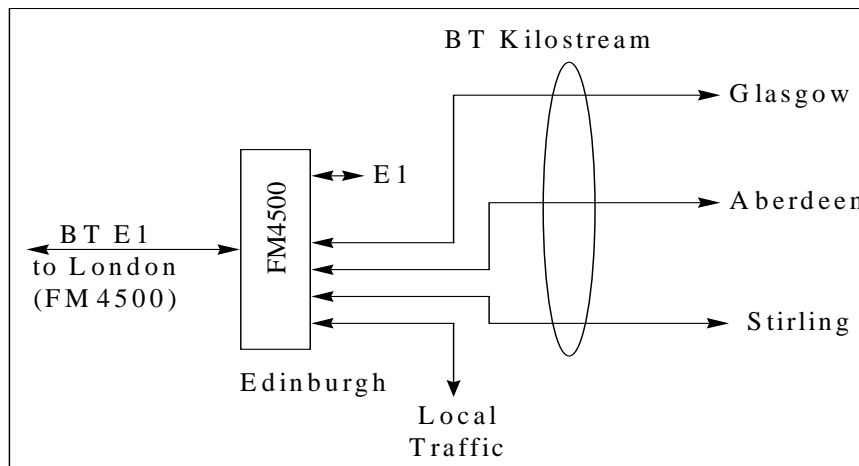


Figure 3: Using the FM4500 to fan out over a kilostream.

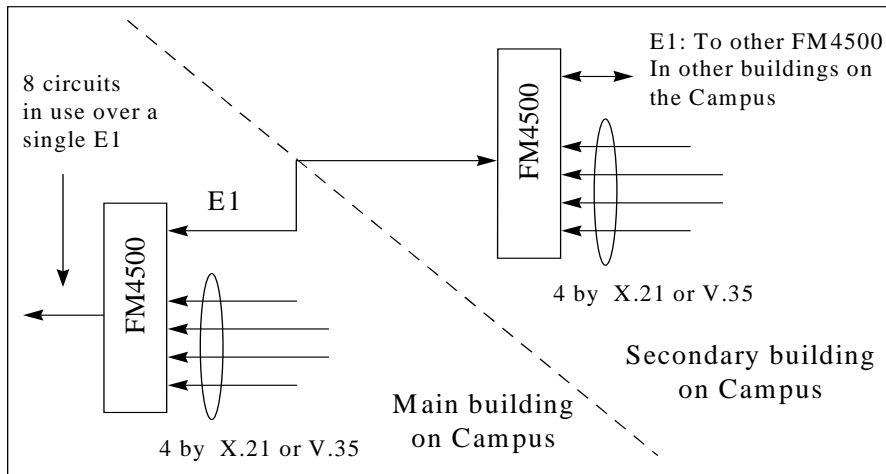


Figure 4: Using the FM5400 to feed multiple sites.

The G.703 output ports of the Metrodata FM4500s can be used for longer-distance connections. These could support PBXs, DSUs (with attached routers, bridges, etc.), or other Metrodata FM4500s. By these means the Metrodata FM4500s can be daisy-chained either locally or over a wide area so as to split and deliver the bandwidth exactly as desired to the different users. See fig. 4.

In this role as service multiplexer/CLE, the Metrodata FM42/4500 can offer the following benefits:

- Simplicity of service delivery for carrier
- Totally flexible provision of delivery of bandwidth at any given location
- Ability for users to receive upgraded bandwidth through simple reconfiguration

Centralised control and configuration of the FM42/4500s can be done via optional SNMP management modules in the form of the Metrodata LM1100. Alternatively these functions can be performed on one unit to another by using the multiplexers built-in Management-Link (part of the built-in Enhanced Line Performance Monitoring) and a dedicated 64Kbps channel. A network controller can also use these facilities to monitor the performance of the line for any errors and conduct line tests (loopbacks and test pattern generation).

The Metrodata FM42/4500 is an ideal means for a service provider to supply an n x 64Kbps digital leased line service. Its flexibility and management features offer the service provider with the following benefits:

- Full n x 64Kbps bandwidth allocation facilities.
- Upgradability of bandwidth provision from centralised control points.
- Full flexibility of bandwidth allocation to different parts of the network and to different users.
- Centralised monitoring and testing facilities for all communication links.
- Centralised management, control and configuration of all units.



For a service provider the Metrodata FM42/4500 provides a very cost-effective, controllable and flexible means to supply an n x 64Kbps digital leased line service. For the service provider's customers it provides a service where any incipient faults can be readily detected and rectified. It also provides them with an inherently flexible, responsive and upgradable service.

## Management Options for the FM4200 & FM4500

The FM42/4500 is manageable, and application note APN005 shows the various ways of managing this unit. Below is a table that lists the 8 ways of managing these units.

Option	Management path		Method
1	Local	Eng. on site	Laptop PC via the V.24 port on the DSU
2	Remote	End user LAN	External modem connected to the V.24 port
		Telnet and SNMP	
3	Remote	End user LAN	LM1100 module, via customer Router
4	Remote	Carrier direct	LM1100 module, via remote access router (Cisco 761)
5	Remote	End user LAN	Aux. Console on customers Router to V.24 port
		Telnet/SNMP via SLIP in to the V.24 port (available Mar 1999)	
6	Remote	Carrier direct	Via external Modem
7	Remote	End user LAN	Via Router Auxiliary port
8	Remote	Carrier direct	Internal Modem (available July 1999)

