Patapsco's PacketBand©-TDM-4E

Application Overview

TDM over IP and Ethernet services with Plesiochronous clocking, Asymmetrical packetisation and optional LACP and RSTP

Product Overview

The PacketBand-TDM-4E has the same flexibility and functionality as the TDM-4D in delivering a highly-accurate E1 or T1 services over packet networks, but with four main additional facilities or enhancements:

- Plesiosynchronous clocking which means each "end" of the E1/T1 circuit can have different clocks
- Plesiochronous clocking also enables any/all E1/T1 ports to be clocked separately should they be derived from different equipment
- Asymmetrical packetisation which means the packet sizes can be of any size and different in each direction giving clock and reliability advantages in some types of networks (mainly wireless)
- Optional LACP which aggregates more than one network circuit together for load-balancing, higher capacity and resilience
- Optional RSTP for Ethernet network protection and circuit resilience
- These features are also supported on the single port TDM-1E and the 8 and 16/32 port resilient chassis system

NOTE: This brochure should be read in conjunction with the "PacketBand-TDM-4D Technical Specification" as this identifies the core capabilities common between the two products; this document focuses on the differences.

Overview

In addition to the PacketBand-TDM-4D's excellent circuit emulation (CES) or TDM over IP capabilities, the TDM-4E has further clocking options for some specific niches and applications. It also has available optional LACP for link aggregation and resilience, plus optional RSTP for Ethernet network protection and resiliency.

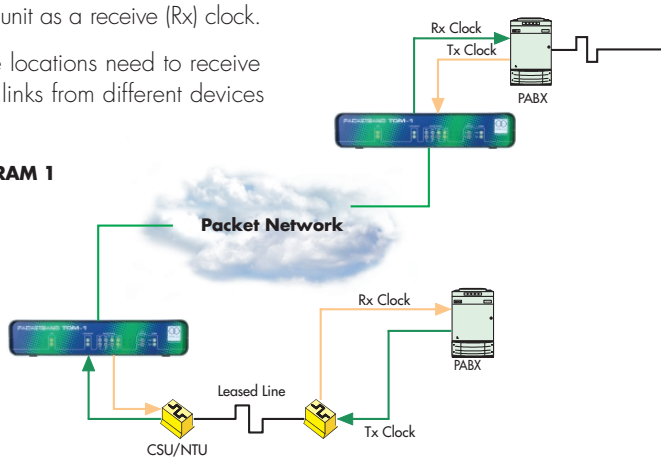
Plesiochronous Clocking

Plesiochronous working means the TDM-4E can support different clocks on each E1/T1 circuit and in each direction.

If the TDM links at both ends give clock these clocks may be slightly different. Diagram 1 shows two devices which are giving clock and PacketBand takes each device's transmit (Tx) clock and delivers that to the other unit as a receive (Rx) clock.

Some locations need to receive TDM links from different devices

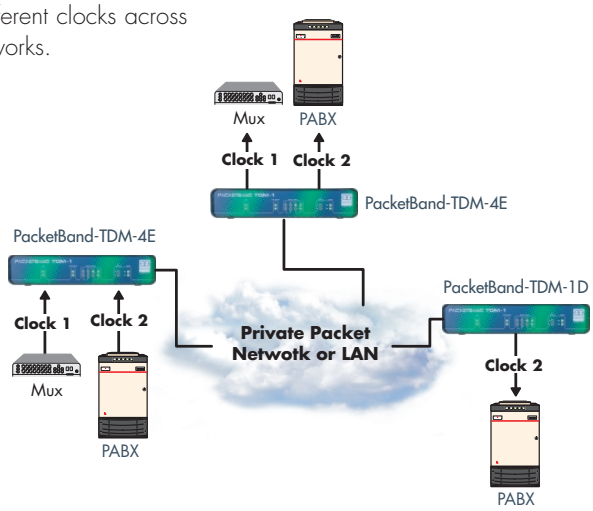
DIAGRAM 1



(and/or different locations) which may have different clocks. The TDM-4E, as shown in Diagram 2, can provide different clocks on each TDM port.

The TDM-4E's clocking capabilities opens unique opportunities to network different clocks across packet networks.

DIAGRAM 2



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Asymmetrical Packetisation

E1 and T1 circuits are based around a clock cycle speed of 8KHz and this is also often the core frequency for many transport systems, especially wireless. Running the TDM circuits over the Ethernet/IP network using a 8KHz clock, which is then transmitted across a network based on 8KHz clocks can often cause an interaction between the transport clock and the 8KHz based clock of the E1 architecture. This undesirable condition will cause severe difficulties for acurate clock extraction algorithms as it generates large fixed pattern rythmic jitter, known as "beating".

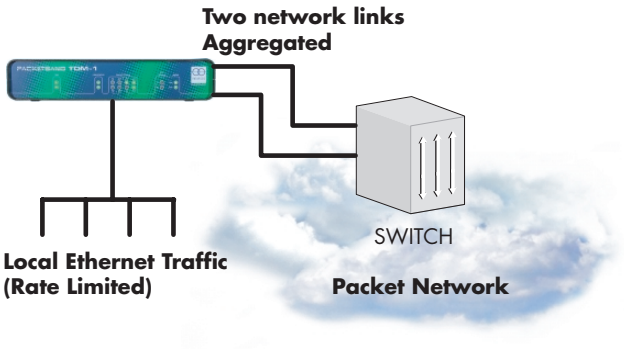
The TDM-4E's configuration allows the packets to be sized to avoid the 8KHz transmit frequency and therefore not generate the "beating" effect. It has also been identified that running different packet sizes in each direction can further improve throughput and clock recovery.

For more information and assistance please contact Patapsco.

LACP Application Example

PacketBand-TDM-4E can have two or more Ethernet ports aggregated together using Link Aggregation Control Protocol (LACP) as defined in IEEE 802.3-2005.

This aggregation enables multiple network links to appear to the PacketBand (and any attached local Ethernet devices) as a single high-speed circuit with load-sharing between destination points. This has the effect of increasing available bandwidth and, critically, of providing resilience should a circuit fail.



Aggregation is an Ethernet layer function that occurs between directly-connected full duplex partners (i.e. between the PacketBand and the switch to which it is connected). All links must run between the PacketBand and a single network switch. The PacketBand and Ethernet switch at each end of the links exchange LACP frames to determine the peer's status enabling appropriate aggregations to be formed and managed automatically.

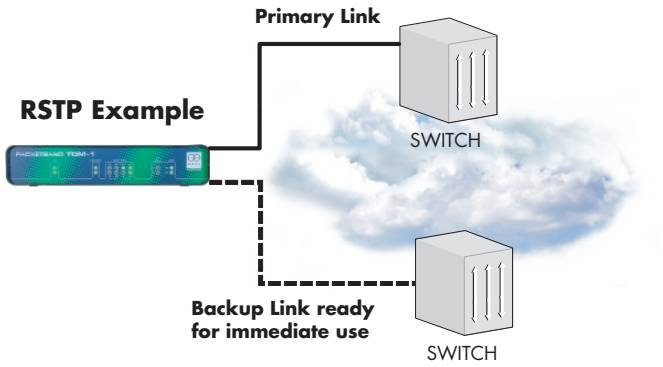
Ethernet ports may be network or user.

LACP is optionally available on the PacketBand-TDM-4E from January '09

RSTP Application Example

Any Ethernet network must form a "tree" structure with no possibility of loops. Inadvertently adding a loop can cause broadcast and multicast frames to flood all ports and all switches as there is no way to detect or drop looped traffic - this can quickly disable a network. Rapid Spanning Tree Protocol (RSTP) defined in IEEE 802.4D-2004 enables physical loops to be established in Ethernet networks for resilience and to provide protection from packet storms.

RSTP on the PacketBand protects the Ethernet network from forming a loop, but still enables more than one link to be established to different switches. Multiple circuits from PacketBand to different network switches means there is an alternate route ready and pre-configured for immediate use should the circuit in use fail.



Each bridge/switch works out the topology of the network and only enables a subset of the connected ports. The resulting network is a tree with no loops and there is spanning (i.e. communications paths between all bridges). RSTP continuously monitors the physical network connectivity and can quickly reconfigure the network as required to remove newly added loops or to enable redundant links to be used in the case of another link failing.

RSTP is an improved version, and is compatable with, the original Spanning Tree Protocol (STP). The PacketBand-TDM-1MC supports RSTP adding important safety and resiliency options.

RSTP is optionally available on the PacketBand-TDM-1MC from February '09

To investigate how PacketBands can help you, please contact Patapsco or your supplier.

Technical details and additional product information can be found in the "PacketBand-TDM-4D Technical Specification" document.

For ordering infomation, see separate document

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