



PARADISE DATACOM APPLICATION NOTE

G703 Clock Extension

EVO_AN_002

Introduction

Starting with SW version 1.49a, a G.703 Clock extension mode is available in order to provide the transport of a high stability G.703 (T1 or E1) timing reference to the distant end of a satellite link, **regardless** of the actual data rate of that link.

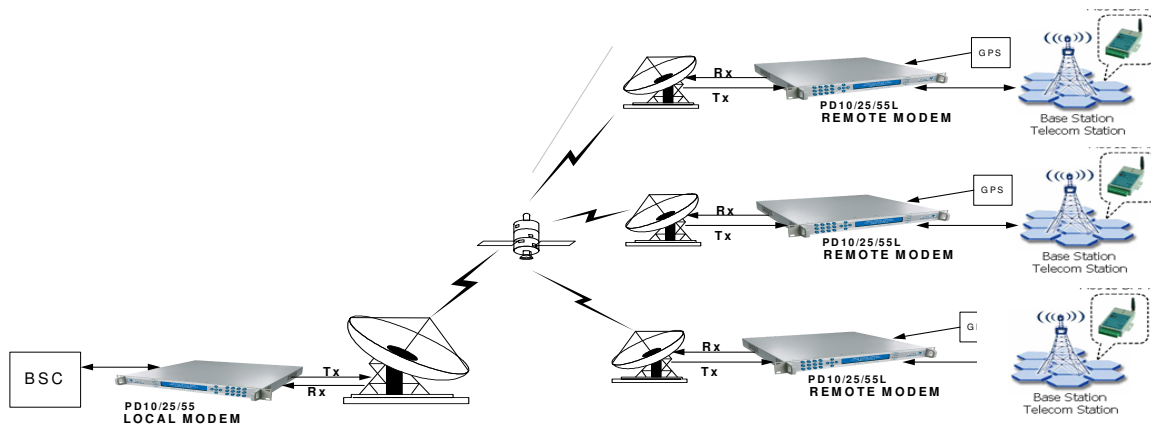
The G.703 Clock extension mode is also available when using the IP interface.

Background

Poor accuracy of frequency references used in GSM base transceiver stations (BTS) can lead to dropped calls, slow handover between cells and even co-channel interference

Therefore the basis of any robust and reliable GSM network is good quality synchronisation references. This becomes a challenge when using IP backhaul. Most operators are forced to use GPS-based external equipment for site synchronization.

Sometimes this is accomplished by adding a specialized GPS receiver at the *remote* end, which then provides the G.703 synchronizing signal. Even though the satellite link itself may be operating at a data rate other than 1.544 Mbps or 2.048 Mbps.

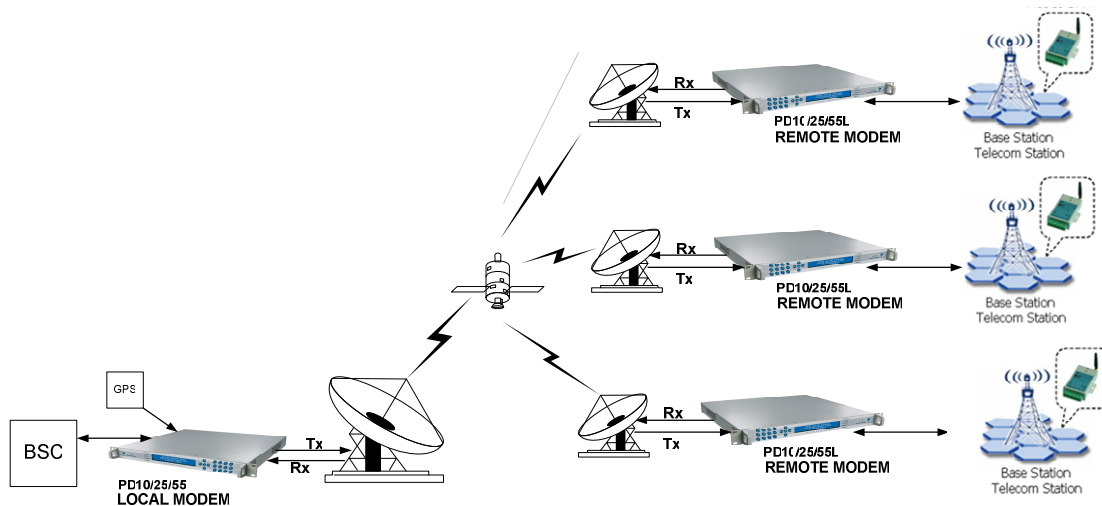


Typical system block diagram without G703 Clock extension

The EVOLUTION Satellite Modems offer G.703 clock extension that propagates a high stability reference from *hub* to the *remote*. A high stability E1/T1 reference signal from a GPS receiver is fed to the **hub** modem, thereby saving the cost of multiple GPS receivers at the remote sites.

The remote modem can then generate a T1/E1 signal synchronized to the local modems GPS signal (via the satellite clock). This signal can then be used for synchronizing the remote site equipment.

Furthermore even if a GPS receiver is not present in the network the remote modem can *still* synthesize a T1/E1 synchronization signal; in this case the synchronization signal will be locked to the satellite clock.



Typical system block diagram with G703 Clock extension

Tx Operation

This is a special case of Internal Tx Clock. When the user selects Internal clock *and* the selected terrestrial interface is *not* G703 the user is asked a further question:

Do you wish to forward the G703 clock as a clock reference:

Options : Off/T1/E1.

If the user selects off then the internal data rate clock generated by the modem is locked to the modems internal high stability clk reference. (this is the same as original internal clock mode of operation)

If however the user selects T1/E1 then the internal data rate clock generated by the modem is locked to the T1/E1 timing signal applied to the G703 Port.

NOTE: this mode is only accessible when the user selects internal clock and the selected Terrestrial interface is NOT G703

Rx Operation

This is a special case of Satellite Clock. When the user selects Satellite clock *and* the selected terrestrial interface is *not* G703 the user is asked a further question:

Do you wish to generate a G703 clock reference from satellite clock:

Options : Off/T1/E1.

Any selection on this screen will result in the original behavior for the rx data. ie the generated rx clock for the rx data path will be at the requested rx data rate and locked to the satellite signal.

If however the user selects T1/E1 then the modem will *also* generate an Alt1/0 timing reference signal at either T1 or E1 on the appropriate G703 port.

NOTE: this mode is only accessible when the user selects satellite clock and the selected Terrestrial interface is NOT G703 (T1 is not available when EIA530 mode is used as the same physical connector is required for T1 balanced operation).

Summary

Cellular networks require precise synchronization of base stations, which becomes a challenge when using IP backhaul. Most operators are forced to use GPS-based external equipment for site synchronization.

The EVOLUTION Satellite Modems offer G.703 clock extension when using IP backhaul, that propagates a high stability reference from hub to the remote. A high stability E1/T1 reference signal is fed to the hub modem. The remote modem generates a T1/E1 signal synchronized to the reference signal that can be used for synchronizing the remote site equipment.