



# **HPX-1600 USER GUIDE**

## **Chapter 4-3: MPS DCE/DTE Clocking**

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# 1. INTRODUCTION

Haliplex HPX-1600 series of multiplexers can be optionally fitted with a serial interface IM (Interface Module).

This chapter discusses the way the data clocks are treated in the MPS, and technical issues that the installer should be aware of when either testing the interface or connecting to other communications devices.

The MPS can be configured to run the following protocols;

- V.24
- V.35
- X.21
- RS-530
- RS-530A

In each of the protocols the MPS can be configured to operate the signalling and synchronous clocking as either;

- DCE
- DTE

In addition to changing the configuration, the correct external cable that matches the protocol and clock mode must be used.

The Haliplex MPS will always supply the network clock to all attached devices regardless of DCE or DTE mode.

## 1.1.1. DCE MODE

For MPS DCE mode the connection is simple and follows all conventions by generation of both Receive and Transmit clocks in the DCE and connection of these to the attached DTE device.

MPS in DCE mode					Signal direction	DTE attached device
Signal Name	V.24 DB25 pin Circuit name	V.35 M-34 pin Circuit name	X.21 DB15 pin Circuit name	RS-530/RS-530A DB25 pin Circuit name		
Transmit Clock (TxC)	15	Y 114 AA 114		DB(A) 15 DB(B) 12	→	Receive Clock (RxC)
Receive Clock (RxC)	17	V 115 X 115	6 S 13 S	DD(A) 17 DD(B) 9	→	Transmit Clock (TxC)

**Table 1: DCE mode clocks**

1.1.2. DTE MODE

The MPS operation in DTE mode is designed to provide a synchronised clock and data connection to line drivers or modems that have a “DCE appearance” and are typically used on tail circuits over copper wires.

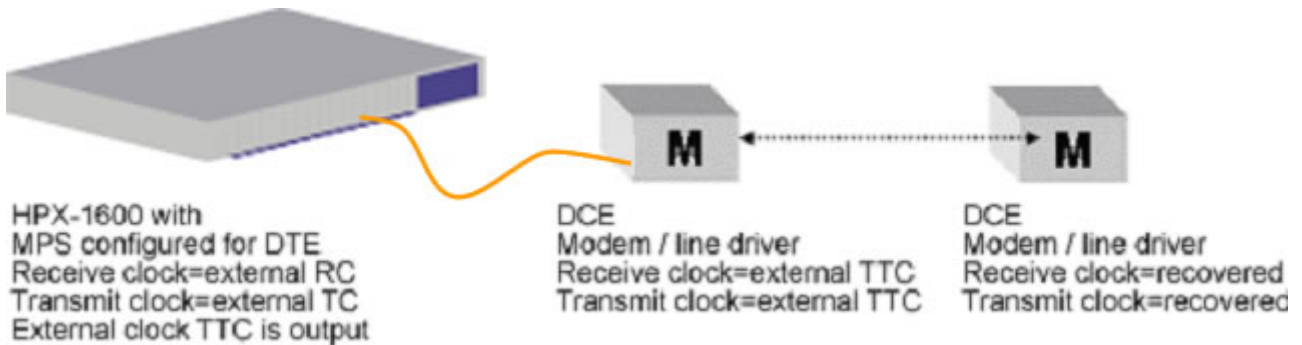


Figure 1: DTE mode and line drivers

In DTE mode, the MPS generates External Transmit Clock (may also be called SCTE or Terminal Timing Clock) and expects that the connected DCE device, loop connects this clock back to the MPS as Receive and Transmit clocks.

Complications can arise when the MPS is configured in DTE mode and the attached DCE device is either not configured correctly or does not support an external clock definition for both the Transmit and Receive clocks.

MPS in DTE mode					DCE attached device
Signal Name	V.24 DB25 pin Circuit name	V.35 M-34 pin Circuit name	X.21 DB15 pin Circuit name	Signal direction	Signal Name
Transmit Clock (TxC)	15	Y 114 AA 114		↑	Receive Clock (RxC)
Receive Clock (RxC)	17	V 115 X 115	6 S 13 S	←	Transmit Clock (TxC)
Terminal Transmit Clock	24	U 113 W 113	7 X 14 X	→	External Transmit Clock

Legend	Connection type
→	DCE – DTE cable connection
- - - - ->	Connection internal to DCE or DTE

Table 2: DTE mode clocks

**Note** The MPS in DTE mode internally connects RxC to TxC. Both RxC and TxC may be connected from the DCE to the MPS but the RxC **must** be provided to the MPS interface.

The attached DCE device must be configured for ;

- Transmit Clock = External Clock
- Receive Clock = External Clock

### 1.1.3. TEST EQUIPMENT

In general and without conducting tests of all of the modem/line-driver and test equipment on the market, most modem/line-drivers appear to be capable of all the correct external clock settings. There is however a problem with some models of V.35 interface test equipment when set to DCE mode and using the TTC external clock. The problem is that only the receive clock uses the external clock with the transmit clock being supplied by a clock which is internally generated by the test equipment. This clock configuration will report test errors such as clock slips. The following is an incomplete list of equipment with the known compatibility.

- Nokia V.35 modem / line driver operates successfully
- Firebird 6000A operates in DCE mode with both Rx and Tx clocks set to external
- HP 37732A operates in DCE mode with both Rx and Tx clocks set to external
- W&G PFA35 and EDT-135 in DCE mode, Transmit clock **does not appear to be capable of** being set to external

**1.1.3.1. MPS DTE TEST PROCEDURE : FIREBERD IN DCE MODE USING TTC**

These test instructions are for the direct connection of a FireBERD test set in DCE emulation to a MPS in DTE mode. Correct FireBERD cables must be used. This test does not require a “null-modem” cable.



**Figure 2 : DTE testing using FireBERD in DCE mode**

Using the FireBERD 6000A to TEST HPX333 & HPX303 **V.35** DTE mode

**Gen Clk**

SYNTH  
INTF\*\*  
BNC

**Timing Mode**

SYNC \*\*  
ASYNCR  
RECOVD

Using FireBERD 6000A to TEST HPX333 & HPX303 **V.24** DTE mode

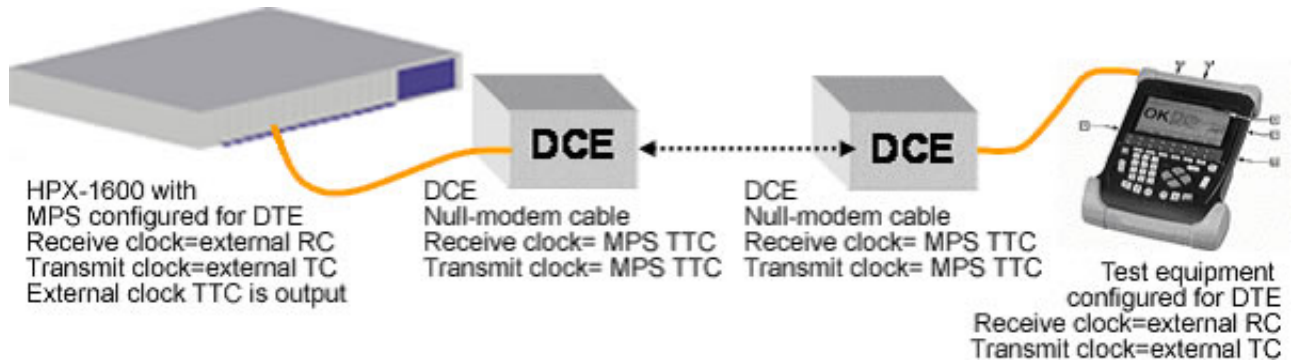
INTERFACE = INT232  
Emulate = DCE  
Gen Clk = INTF  
Timing Mode = SYNC  
Aux7 (RCVR CLK SEL) = either TT or AUTO (not ST)

Using FireBERD 4000 to TEST HPX333 & HPX303 **V.24** DTE mode

INTERFACE = INT232  
Emulate = DCE  
Timing = SYNC  
Rcv Clk = TT  
GEN CLOCK = INTF

**1.1.3.2. MPS DTE TEST PROCEDURE –TEST SET IN DTE MODE**

The following test procedure is recommended for testing of MPS interfaces in DTE mode. This procedure has been reliably tested with a range of models of test equipment. This test requires that both the test equipment and the MPS be set to DTE mode. The problems associated with the configuration of clocks, is managed by the use of a “null-modem” cable.



**Figure 3 : DTE testing using a Null-modem cable**

It is important that the following key points are followed;

- Use only the correct cables
- Do not use additional cable extenders or gender converters
- Ensure that the “null-modem” cable is not reversed.
- Set the MPS for DTE mode
- Set the test equipment for DTE mode
- Set the remote end of the Haliplex network to loop back
  - Loop back may be set at;
    - The MPS HIM connector
    - The digital cross connect
    - The trunk interface E1 or fibre optic of the Haliplex multiplexer.

**1.1.3.2.1. ACTERNA (W&G) IN DTE MODE**

For the PFA-035, EDT-130 and EDT-135.

Use one of the following Acterna DTE mode V.35 cables;

- K1508
- K1510
- K1525

Set up as follows;

Interface = V.35  
 Framing = Sync  
 Emulation = DTE  
 Tx clock = EXT: TC  
 Rx Clock = EXT: RC

**1.1.3.3. CABLES: HALIPLEX**

Check the cable part number that is connected to the Haliplex MPS.

DCE cables;

- V.24 HPX-1600 Cable 004
- V.35 HPX-1600 Cable 002
- X.21 HPX-1600 Cable 000
- RS-530 HPX-CAB-RS530-DCE

DTE cables;

- V.24 HPX-1600 Cable 005
- V.35 HPX-1600 Cable 003
- X.21 HPX-1600 Cable 001
- RS-530 HPX-CAB-RS530-DTE

DCE null modem cable;

- V.35 HPX-1600 Cable 012

Signal function	Mnemonic	Label: "MPS"	Cable length to be minimal Back to Back Winchester 34 pin blocks ideal, else 100mm.	Label: "Tester"
		Connects to MPS V.35 DTE cable		Connects to BERT test set V.35 DTE cable
		Female M34/pin		Female M34/pin
Frame ground	101/FGND	A		A
Signal ground	102/SGND	B		B
Request to send	105/RTS	C		C
Clear to send	106/CTS	D		D
Data set ready	107/DSR	E		E
Data carrier detect	109/DCD	F		F
Data Terminal Ready	108/DTR	H		H
Transmit data(a)	103/TD	P		P
Transmit data(b)	103/TD	S		S
Receive data(a)	104/RD	R		R
Receive data(b)	104/RD	T		T
Terminal Tx clock(a)	113/TTC	U		V
Receive clock(a)	115/RC	V		V
Transmit clock(a)	114/TC	Y		Y
Terminal Tx clock(b)	113/TTC	W		X
Receive clock(b)	115/RC	X		X
Transmit clock(b)	114/TC	AA		AA

**Table 3 : V.35 "null-modem" cable 012**

### 1.1.4. LOOP BACK TEST CONNECTORS

The MPS has internal test facilities, which enable loop backs to be applied. Where the electrical interface of the MPS is to be tested, an external loopback connector should be used.

#### 1.1.4.1. MPS IN DCE MODE

Loop back Test plug: MPS in DCE mode				
Signal Name	V.24 DB25 pin	V.35 M-34 pin	X.21 DB15 pin	RS-530/RS- 530A DB25 pin
Data	2 – 3	P – R S – T	2 – 4 9 – 11	2 – 3 14 – 16

**Table 4: DCE loopback test plug**

#### 1.1.4.2. MPS IN DTE MODE

Loop back Test plug: MPS in DCE mode				
Signal Name	V.24 DB25 pin	V.35 M-34 pin	X.21 DB15 pin	RS-530/RS- 530A DB25 pin
Data	2 – 3	P – R S – T	2 – 4 9 – 11	2 – 3 14 – 16
Clock	24 – 17	U – V W – X	6 – 7 13 – 14	

**Table 5: DTE loopback test plug**