KiloStream Data Sheet

KiloStream speeds

The choice of interfaces and speeds shown below enable a wide variety of equipment conforming to CCITT* standards to be connected.

Speeds and interfaces

Speed kbit/s	X.21	X.21 bis (V.24)	X.21 bis (V.35)
2.4	*	*	
4.8	*	*	
9.6	*	*	
19.2	*	*	
48	*		*
64	*		

Access to the KiloStream service is via a Network Terminating Unit (NTU) on the customer's premises. This NTU is linked to a KiloStream network multiplexor located at the local exchange. At speeds up to and including 48kbit/s, a KiloStream circuit offers a built in remote diagnostics capability. This allows BT to monitor performance and to check for problems while the line is in operation.

KiloStream technical data

KiIoStream X.21

The X.21 interface is a 15 way D-type socket (female) and is available at all speeds. The offering is set as shown below with no variable options.

2.4-48kbit/s structured circuits
Local and remote loops may be activated by means of buttons on the NTU or by the Data Terminal Equipment (DTE).

Remote loops
Remote loops can be applied from the DTE if the following conditions are satisfied:

- The Control (Circuit C) is OFF

- The DTE sends a continuous 11001100 pattern

- This pattern must be preceded by at least one Binary 1 within the preceding 16 bit intervals

- Loop activation is indicated by return of the 11001100 sequence. The DTE responds to loop activation within 0.7 seconds by an OFF to ON transition on the Control (Circuit C)

- The loop will subsequently be removed when an ON to OFF transition is placed on the Control (Circuit C) by the DTE.

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Local loops

Local loops can be applied from the DTE if the following conditions are satisfied:

- The Control (Circuit C) at both ends is OFF

- The DTE sends on the T circuit a binary pattern consisting of 11001100 with control OFF

- This pattern must be preceded by a continuous Binary 0 pattern persisting for at least 24 bit intervals

- Loop activation is indicated by return of the 11001100 sequence. The DTE responds to loop activation within 0.7 seconds by an OFF to ON transition on the Control (Circuit C)

- The loop will subsequently be removed when an ON to OFF transition is placed on the Control (Circuit C) by the DTE.

The local loop pattern is referred to as Local Loop Code A. All KiloStream NTUs will respond to this code, although those with an LCD display will also respond to Local Loop Code B. This code consists of a continuous 11110000 pattern. All other conditions are the same as for Local Loop Code A activation.

64kbits/unstructured circuits

On X.21 unstructured circuits test loops can only be applied at the NTU.

X.21

Interchange circuits X.21				

CCITT circuit designation	Direction of signalling	Circuit description	PIN number A	B
G		Common return	8	-
T	DTE-NTU	Transmit data	2	9
R	NTU-DTE	Receive data	4	11
C	DTE-NTU	Control	3	10
I	NTU-DTE	Indication	5	12
S	NTU-DTE	Signal element timing	6	13
Circuits working at 64kbit/s data rate are 'unstructured' and use G, T, R and S circuits. However, I circuit will be permanently ON except under fault conditions				

KiloStream X.21 bis (V.24 and V.35)

These interfaces allow connection of data terminal equipment which is designed for interfacing to synchronous V series modems.

V.24 presentation can be supplied for speeds up to and including 19.2kbit/s using a 25 way D-type socket (female). There are further sub-options on electrical interchange circuits 106, 107 and 108/1. (See options table).

V.35 presentation can only be supplied for a speed of 48kbit/s, using a MRAC 34S-J2 socket (female). There are further sub-options on electrical interchange circuits 106 and 107. (See *Options for X2l bis* table below)

Local and remote loops

Remote and local loops may be activated from either the NTU or the DTE.

Remote loops are controlled via circuit 140. If this circuit is ON, a remote loop is applied. When the condition on circuit 140 is removed, the loop is deactivated.

Local loops are controlled in a similar manner; but utilise circuit 141.

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X.21 bis (V.24)

Interchange circuits X.21 bis (2.4-9.6kbit/s and 19.2kbit/s)

CCITT circuit number	Direction of signalling	Circuit description	PIN number
102	-	Common return	7
103	DTE-NTU	Transmit data	2
104	NTU-DTE	Receive data	3
105	DTE-NTU	Request to send	4
106	NTU-DTE	Ready for sending	5
107	NTU-DTE	Data set ready	6
108/1	DTE-NTU	Connect data set to line	20
109	NTU-DTE	Data channel received line signal detector	8
114	NTU-DTE	Transmitter signal element timing	15
115	NTU-DTE	Receiver signal element timing	17
140	DTE-NTU	Remote loopback	21*
141	DTE-NTU	Local loopback	18*
142	NTU-DTE	Test indicator	25*
It these circuits are not used by the DTE they must be correctly terminated or disconnected (see note 1)			

X.21 bis (V.35)

Interchange circuits X.21 bis (48kbit/s only)

CCITT circuit number	Direction of signalling	Balanced circuit	Unbalanced circuit	Circuit description	PIN designation A	T
102	-		*	Common return	B	
103	DTE-NTU	*		Transmit data	P	S
104	NTU-DTE	*		Receive data	R	T
105	DTE-NTU		*	Request to send	C	
106	NTU-DTE		*	Ready for sending	D	
107	NTU-DTE		*	Data set ready	E	
109	NTU-DTE		*	Data channel received line signal detector	F	
114	NTU-DTE	*		Transmitter signal element timing	Y	AA(a)**
115	NTU-DTE	*		Receiver signal element timing	V	X
140	DTE-NTU		*	Remote loopback	N*	
141	DTE-NTU		*	Local loopback	L*	
142	NTU-DTE		*	Test indicator	NN*(m)**	
It these circuits are not used by the DTE they must be correctly terminated or disconnected (see note 1)						
**Letters in brackets ( ) indicate alternative connector labelling						

Note 1: Interchange circuits not used by the DTE

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It is important that all conductors connected to pins listed in the table are either:

a) Correctly terminated at the DTE as specified in relevant CCITT* recommendation at all times

b) Disconnected on the interface cable at the NTU connector end.

This avoids spurious conditions on interchange circuits causing incorrect operation of the NTU.

This is especially important on loop control circuits 140 and 141.

X.21 (V.24 and V.35) sub-options

The table below shows the various option codes used by BT to ensure a new circuit is correctly configured. The first options shown in each case are the most likely to be used.

Options for X.21 bis

CCITT interface	Interchange circuit with an option	BT suggested defaults	Customer alternatives
X.21 bis (V.24)	Circuit 106 Ready for send delay (RFS)	Zero delay	l0-2Oms delay
	Circuit 108/1 Connect data set to line (CDSTL)	Permanently ON	Controlled by terminal equipment
	Circuit 107 Data set ready (DSR)	To follow CDSTL	Set OFF under fault conditions
X.21 bis(V.35)	Circuit 106 Ready for send delay (RFS)	Zero delay	10-2Oms delay
	Circuit 107 Data set ready (DSR)	To follow CDSTL	Set OFF under fault conditions

On site termination equipment
Network Terminating Unit (NTU)

A KiloStream circuit is provided with an NTU at either end. These units provide the correct interfaces to CCITT[*] standards and are connected to a mains power supply

The NTU consists of a single printed circuit card which can be housed in one of two ways.

Single unit
The NTU is housed in a moulded plastic case which is designed to rest on a desk top. The customer's Data Terminal Equipment interface is located at the rear of the case, together with a line connection card and a 3 metre long mains cable complete with a BS1363, 3 pin moulded plug top.

Multiple installation
The NTU can be mounted in a KiloStream shelf. The shelf is in 19 inch rack equipment practice, 6 vertical units (VUs) high. It can provide for up to 12 KiloStream circuits of any combination of types.

Power supply

Single unit
The socket must meet the requirements of British Standards Specifications BS1363 and be wired in accordance with the 15th edition of the lEE wiring regulations. Subject to building fire regulations, this unit must be powered at all times.

Shelf Mounted
The external power supply should be connected on installation and the shelf power unit switched ON. Again, subject to building fire regulations, this unit must be powered at all times.

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Shelf mounted NTU specifications

Dimensions	H 261 mm x W 25mm x D 248mm
Weight	0.55kg
Power requirements	240V at 50Hz
Power consumption	Approximately 7 watts (100 watts fully loaded shelf)

Single unit specifications

Dimensions	H 55mm x W 251 mm x D 274mm
Weight	2.9kg
Power requirements	240V RMS AC -10% to +6% 45Hz to 55Hz
Power consumption	Approximately 8 watts
Operating environment	5^0C to 55^0C Relative humidity 90% non-condensing (max) at a temperature range of 20-45^{0}C

KiloStream shelf specifications

Dimensions	H 266mm x W 482mm x D 269mm (6VU)
Weight	16.12kg
Power Requirements	240V RMS AC 45Hz to 55Hz
Power consumption	Approximately 100 watts fully equipped
Operating environment	5^0C to 55^0C Relative humidity 90% non-condensing (max) at a temperature range of 20-45^{0}C

The shelf can also be housed in one of two ways

Housing	Number of shelves/circuits	Dimensions	Description
Case	Up to 1/12	H 270mm W 540mm D 400mm	A metal case with a perspex front cover designed to rest on a desk top Power, line & data interface connectors are provided at the rear.
Cabinet	Up to 4/48	H 1730mm W 600mm D 600mm	A metal cabinet with full length doors fitted front and rear. Power and line connectors are permanently cabled in Interface connectors are situated at the bottom of the cabinet at the front or as advised
Customer owned rack or cabinet			The shelf can be fitted into any suitable l9in practice rack subject to BT approval.

KiloStream performance

The current technology and environment of digital networks worldwide, means it is impossible to provide a completely permanent and error-free path between two network nodes or terminations, and occasionally errors will occur. CCITT* have evolved a standard for network performance and availability known as G821, which takes account of adverse factors affecting network behaviour. Suppliers of networks and communications equipment use this standard to derive a specification for their products in conjunction with the expectations of the communication systems and applications.

As the *KiloStream performance parameters* table below shows, KiloStream digital private circuits are extremely reliable - offering 99.5% error-free seconds per annum. This level of performance exceeds the CCITT* G821 standard.

The BT target figures for error performance are expressed in a manner consistent with CCITT* recommendation G821. This recommendation defines performance at the 64kbit/s level only;

There is no CCITT* measurement agreement for bit rates lower than 64kbit/s, but BT recommends a similar measurement standard with the error count threshold as follows:

Error parameter A - an error free second is a second in which no errors occur.

Error parameter B - the error count threshold for a data rate of 48kbit/s is three or less bit errors in a minute period.

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For data rates of 19.2kbit/s, 9.6kbit/s, 4.8kbit/s and 2.4kbit/s, the error count threshold is 12, 6, 3 and 2 or less bit errors respectively in a 10 minute period.

Error parameter C - the error count threshold for data rates of 48bit/s, 19.2kbit/s. 9.6kbit/s, 4.8kbit/s and 2.4kbit/s in 48, 20, 10.5 and 3 or less respectively in a one second period

KiloStream performance parameters

Performance parameters	A	B	C
	% error free seconds	% 1 minute periods with error ratio better than 10^{-6}	% 1 second periods with error ratio better than 10^{-3}
Envisaged performance based on CCITT* recommendation G821	98.8	98.5	99.935
BT target	99.5	99.5	99.95

When assessed over a one year period, KiloStream circuit availability will, in most cases; be better than 99.85%. This is equivalent to 13 hours unavailability in one year. A circuit is deemed to be unavailable where there is no data throughput for a period greater than 10 seconds, or when the error ratio exceed 10^{-3} for more than 10 consecutive seconds.

Intermittent breaks greater than 10 seconds in duration

% break free days	80
% days with one break	12
% days with two or more breaks	8

Note: This performance relates to an averaging period of one year.

Long term bit error ratio of 10^{-7}

The long term bit error ratio target limit is 10^{-7} for KiloStream when evaluated over a minimum period of 24 hours, excluding one second periods with error ratios worse than 10^{-3}

Consider this before ordering terminal equipment

Where errors affect the circuit, it is possible that the interchange circuits - 'indicate' or 'carrier detect' - can be momentarily turned to the OFF position. If this happens, the terminal equipment can interpret this as a break in transmission. Your attention is also drawn to the interchange circuit details.

Specifically for KiloStream, you should also check with your supplier for details of the data set ready (107) and the connect data set to line configuration (108/1) applicable to your terminal.

Additional options for X.21 bis are: ready for sending delay 10-20ms or no delay, up to 48kbit/s; connect data set to line circuit; 108/1 enabled or not enabled up to 19.2kbit/s (V.24 only). Data set ready option: circuit 107 to follow circuit 108/1 or set off under fault condition.

For KiloStream structured services, errors in transmission at all speeds through BT's network can cause errors in the received data bits, or errors in the two control bits governing envelope alignment and status. The effect of these errors must therefore be taken into account before ordering your terminal equipment

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