TELEX Application Note

IP-223s Connected Using Wire Line Modems

TETRA network bridge between two Sepura SRM2000/3500 radios

VOIProven TELEX Radio Dispatch

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1.0 General

This application note is intended to assist in the implementing a bridge between TETRA networks, utilizing Telex IP-223s and MuLogic DSL-2084.Eth Modems as the bridging elements, over twisted pair cable.

1.1 Security

In bridging between TETRA terminals, and radio encryption (end-to-end, or simple over-the-air), is removed for transmission over the bridging network.

In dealing with security sensitive systems and equipment, this document is not intended for general publications. The contents of this document is Restricted, Corporate Confidential.

This document outlines methods for the attainment of physical and electrical compatibility.

This document does not infer:

- Approval of the radio integration by security authorities (i.e., UK GCHQ).
- Any level TEMPEST testing and approved has been completed.
- Any Electro-Magnetic Compatibility (EMC) testing and approval.

2.0 Sepura SRM2000/3500 Interface

Set up the IP-223/Sepura interface as directed in the Telex Radio Dispatch application note.

REFERENCE: For more information, see IP-223 to Sepura SRM Application Note, (P/N AN-DISPATCH-011).This document is available for download at www.telex.com/Downloads/.

2.1 Physical Connection

It is recommended that the Sepura terminal be interfaced to IP-223 line-1, via cable assembly, IP-223 CABSRM2000, (P/N 301961000). If IP-223 line-2 must be used, then a DB-9 splitter assembly, IP-223 DB9 SPLITTER, (P/N 301953000) is required to access serial port-2.

2.2 Line Parameters

To **configure line parameters,** do the following:

1. Configure **standard IP-223 Per Line settings** for Sepura SRM.
2. Configure the following **fields** as indicated:

    - TX Delay 500ms
    - RX Delay 100ms
    - Squelch Tail Delay 200ms
    - LAM Level -20dB
    - LAM Time 3sec
    - Full Duplex (NO)
    - RX AGC (YES)

NOTE: Ensure sufficient delays to allow for call setup and clear Delays and levels can be modified to optimize efficiency for the specific TETRA network or customer application.

2.3 IP Cross Connect

To **configure the IP cross-connect within the IP Multicast Setup**, do the following:

> Transpose the **TX** and **RX port numbers** for the radio lines to be bridged.

2.4 Audio Parameters

NOTE: Audio receive levels at the IP-223 are dependant upon the volume control on the front of the TETRA terminal, if not explicitly set within the terminal programming.

To **configure audio parameters**, do the following:

NOTE: Alert tones may cause interference, in some cases denying air access by oscillating around the network.

1. Ensure that all unnecessary Alert Tones are disabled on the interfacing SRM2000/3500.
2. From the configuration software select **Terminal Program|User I/F|Alerts**, and confirm the following settings:
   - Service Alert - Off
   - Key Click Alert - Off
   - Stop Talking Alert - Off
   - Clear Speech Pip Tones - Off
   - Comm Type Mismatch (Direct) Alert - Off
   - Comm Type Mismatch (Gateway) Alert - Off
   - Comm Type Mismatch (Repeater) Alert - Off
   - Covert Mode Enable Alert - Off
   - Covert Mode Disable Alert - Off
   - Gateway Found Alert - Off
   - Gateway Lost Alert - Off
   - Whisper Mode Enable - Off
   - Whisper Mode Disable - Off
   - TX Inhibit Enable - Off
   - TX Inhibit Disable - Off
   - TX Granted Alert - None
   - TX Not Granted Alert - (None)
   - Wait For TX Alert - (None)

3.0 DSL-2048.Eth Modem Interface

The DSL-2048.Eth modem provides high-speed data access over a single pair of unconditioned copper wire. It can transport data rates up to 2.048 Mbps without a repeater for more than 5km at a Bit Error Rate of less than 10-7.

3.1 Physical

The DSL modems function as a pair, with a master-slave relationship, (*referred to as, Central and Remote*) Thus, each must be set up independently.

3.1.1 Switch Settings

Set PC/Hub button on the back of the DSL modem as follows.

- Button in the out position for hub on Central modem
- Button depressed in for PC on remote modem.

Set dip-switches 1 and 2, on.

- Switch 1 - Enables or disables the Enhanced Tinygram compression algorithm.
- Switch 2 - Enables or disables the MAC address filtering of the bridge.
    - When off, it forwards only those frames destined for the remote LAN.
    - When on, it transparently passes all frames over to the other side.

3.1.2 Cable Connection

To **connect the cable**, do the following:

1. Using a standard Cat-5e cable, connect the DSL-2048.Eth modem RJ45, 10BaseT port, to the **IP-223 Ethernet por**t.
2. Using the RJ-45 loop port, connect the DSL modem to the **twisted pair line**.

NOTE: Here, only pin 4 and 5 are used.

NOTE: The DSL modem runs on 9-15Vdc power, applied to the rear DC power socket (inner +). After power-on, the DSL-2048 goes through an initialization and start-up procedure; during this time, the LEDs flash to indicate system initialization is in process. When this is completed, the modem is ready for configuration.

> To **connect the modem for configuration**, do the following:

NOTE: Modem configuration is carried out by means of a VT-100 terminal (or a VT-100 terminal emulator on a PC like e.g. MS Hyperterminal).

> Connect a VT-100 terminal (or emulator) to the **supervisory port** at the rear of the modem.

NOTE: Configuration need only be done once, because the settings are held within the non-volatile (EEPROM) memory.

3.2 Modem Configuration

To **connect the modem using HyperTerminal**, do the following:

> Enter settings for **HyperTerminal** as follows:

- 9600-8-N-1 ([9600] data rate, [8] data bits, [N] No parity bits, [1] stop bit).

To **bring up the main menu**, do the following:

> Press **Esc** until the screen shown below appears.

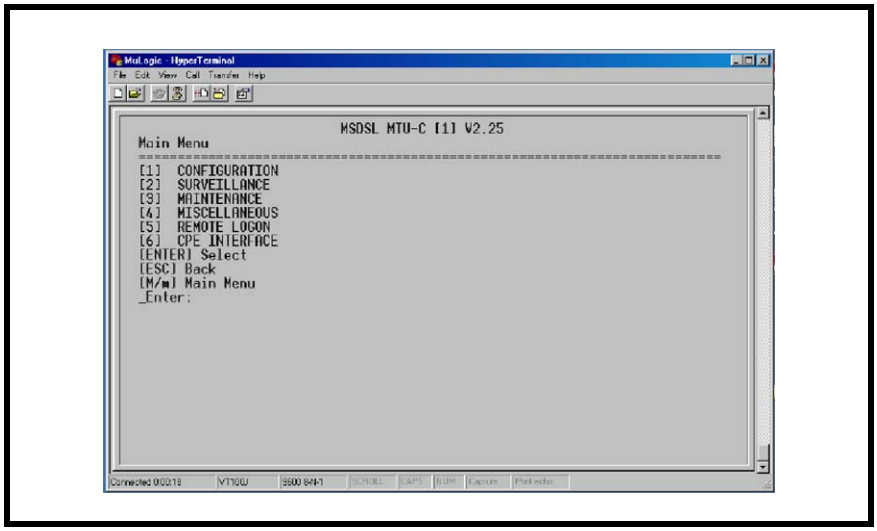

FIGURE 1. DSL-2048 Ethernet Main Menu

3.2.1 Recommended Configuration for TETRA Stretch

Traverse the configuration pages, selecting the following settings.

TABLE 1.

Path to Setting From Main Menu	Central	Remote
[1] Configuration, [1] Unit. Make selection, <enter> or <esc>.	MTU-C[a]	MTU-R[a]
Configuration [2] Set Rate. + up, - down, <enter> or <esc>.	4 x 64kbps	Note
Configuration [3] DTE, [1] Rate [1] *N x 64K <enter> or <esc> twice	N[a] x 64K	N[a] x 64K
Configuration [4] PCLK Make selection, <enter> or <esc>.	INT	DSL

a. Fixed data rate set in MTU-C only

3.2.2 Quick Start and Bandwidth Negotiation

To **configure the DSL-2048 defaults**, do the following:

1. From the configuration software, select **Default Menu**.
   The default settings (lowest data rate) are loaded.
2. From the Unit menu, configure **one (1) of the units** as MTU-C.
3. From the Unit menu, configure the **other unit** as MTU-R.
   The modems connect within 30 seconds and the Loop LED is on.

To **configure the payload rate**, do the following:

1. From the Payload Rate Menu configured for the MTU-C modem, select a higher **payload rate**.
   The modem synchronizes within 25 seconds depending on the selected payload rate.
2. If synchronization does not occur, select a **lower payload rate.**

NOTE: The highest achievable rate depends on the quality of the line wire. When the selected payload rate is too high, the modems do not synchronize and the Loop LED remains on.

4.0 Post Installation Adjustments

Once the bridge is fully configured and working end-to-end, settings may be optimized to network characteristics and operational requirements. For example, IP-223 TX/RX delay times may be adjusted to suit call setup times of the specific network or **DMO** (Direct Mode Operation) configuration in current use. All such adjustments should be made within the IP-223.

NOTES:

Revision History		
Document Title: IP-223s Connected Using Wire Line Modems		
Document Number: AN-DISPATCH-026		
Revision	**Change Description**	**Date**
A	Update brand, format and new document number.	15-NOV-2009

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