DATA SYSTEM LINEUP AND TEST - Item No.

Special Provision No. 683S11 September 2007

1. SCOPE

This Special Provision covers the requirements for the line up and test of the data system. The activities shall include verification of all data circuits, data links, primary and redundant networks, and the integrated data system. This Special Provision details required testing for legacy, Ethernet, and serial over IP communication systems.

2. REFERENCES

This Special Provision refers to the following standards, specifications, or publications:

Electronic Industries Alliance / Telecommunications Industry Association:

EIA/TIA-232-E Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Binary Data Interchange

TIA/EIA-404-B Standard for Start-Stop Signal Quality for Non-Synchronous Data Terminal Equipment

3. DEFINITIONS

For the purpose of this Special Provision, the following definitions apply:

DSLAT: means Data System Lineup and Test

LB: means Loop Back

SLAT: means System Lineup And Test

4. DESIGN AND SUBMISSION REQUIREMENTS

4.1 Submission Requirements

4.1.1 The Contractor shall provide a test procedure to the Contract Administrator describing all equipment and procedures for Data SLAT. The Contract Administrator's approval of the test procedure shall be obtained at least three weeks prior to the beginning of any Data SLAT.

4.1.2 The Contractor shall provide a line diagram representing any testing setup that will be performed.

5. MATERIALS

5.1 A Loop Back (LB) connector shall be used to provide data loop back on all serial data circuits and data links. The LB connector shall be the appropriate size, gender and configuration to be capable of allowing the remote testing of both transmit and receive data circuits and all applicable hardware and/or software flow control signals.

5.2 Other testing kits and materials, as required, shall be used to complete the tests outlined below.

6. EQUIPMENT – Not Used

7. CONSTRUCTION

7.1 Legacy Communication Equipment

7.1.1 The Contractor shall perform the following tests as well as any other tests the Contract Administrator deems necessary. The tests shall be performed on both the primary and redundant networks. Testing shall be performed with various standard data rates up to 19.2 kbps as specified by the Contract Administrator. Burst and continuous data flow shall be used during testing.

7.1.2 The Contractor shall perform all level adjustments required for the data system to operate in accordance with the Contract.

7.1.3 Data SLAT shall occur in three stages.

7.1.4 The first stage may begin after all low speed data devices (FOMs, optical splitters, optical taps and PSDs) and the interconnecting fibre optic links have been installed at a Node. Tests shall be carried out with all modems connected to the optical bus and powered on.

7.1.5 Stages two and three shall begin after all data communication equipment associated with a Data Ring Network has been installed. Stages two and three shall be performed with all Nodes in the Data Ring Network under test powered ON.

7.1.6 Stages two and three shall be performed on at each FDIN and the CDIN.

7.1.7 Each Node shall be demonstrated to be compliant with the specifications.

7.1.8 RTS/CTS signalling shall be used between the multiplexer and the collocated modem to verify correct signal handshaking.

7.1.9 The Contractor shall perform testing of the LCP to demonstrate compliance with the specified performance. The Contractor shall submit a test methodology, which should include detailed procedures including but not limited to demonstrating multiple segment operation, data throughput and propagation delay. The Contractor shall supply all equipment and software required to conduct the testing.

7.1.10 Stage One

7.1.10.1 The first stage shall be the SLAT of all low speed data circuit components including all FOMs, optical splitters, optical taps and PSDs. Stage one shall not commence until all items, which comprise of the low speed data link have passed their respective proof of performance testing.

7.1.10.2 Stage one SLAT shall verify the correct operation of each low speed data circuit between FOM EIA/TIA-232-E interfaces at field controllers and Camera Control Receivers and FOM

and PSD EIA/TIA-232-E interfaces at FDINs. It shall verify proper operation of all interconnecting devices in each circuit by the presence of data and correct control signals.

7.1.10.3 The Contractor shall connect the LB connector to the FOM or PSD being tested starting at the EIA/TIA-232-E port of the low speed data device closest to the DCP under test. The device to which the LB connector is attached is the device which is being tested.

7.1.10.4 The Contractor shall connect a test device which shall input a standard test signal compatible with EIA/TIA-232-E into the correct pin of the EIA/TIA-232-E port of the final device at the point where the FDIN DCP will be connected.

7.1.10.5 The test signal shall be turned ON. The following parameters shall be verified:

7.1.10.6 Circuit CA is in the ON state and present on the correct pin.

7.1.10.7 Test signal is correctly received at the test device on circuit BA at the correct signal level and on the correct pin.

7.1.10.8 When circuit CA is in the OFF state, circuit CF is in the OFF state and when CA changes to the ON state, CF changes to the ON state within 7.2 msec.

7.1.10.9 When circuit CA is in the OFF state, the modem LED and data are in the OFF state and when CA is in the ON state, data is received correctly.

7.1.11 Stage Two

7.1.11.1 The second stage SLAT shall demonstrate correct circuit assignment between DCPs at FDINs and the corresponding CDIN DCP. Stage two shall not commence until all drop / insert nodes and data channel ports have passed proof of performance testing.

7.1.11.2 The Contractor shall verify the correct circuit assignments of each DCP in the Data Ring Network.

7.1.11.3 The Contractor shall set the FDIN DCP to be tested into the loopback mode. All other FDIN DCPs shall not be in loopback.

7.1.11.4 The Contractor shall connect a test device which shall input a standard test signal compatible with EIA/TIA-232-E into the correct pin of the CDIN DCP being tested.

7.1.11.5 The Contractor shall turn the signal generator ON. The following parameters shall be verified:

a) Test signal is correctly received at the test device on circuit BB at the correct signal level and on the correct pin;

b) Circuit CF is ON at the correct signal level and on the correct pin.

7.1.12 Stage Three

7.1.12.1 The third stage shall be the SLAT at each Node of two end-to-end data circuits as they shall be connected in the operating data system. Stage three shall not commence until stages one and two of Data SLAT have passed in their entirety.

7.1.12.2 The Contractor shall attach the LB connector to the EIA/TIA-232-E port of the low speed device being tested. In this test the field device may be a FOM, PSD or DCP. Two end-to-end data circuits passing through a DCP at each FDIN shall be tested. The Contract Administrator will designate the circuits to be tested prior to the test.

7.1.12.3 The Contractor shall connect a test device which shall input a standard test signal compatible with EIA/TIA-232-E into the correct pin of the CDIN DCP interface being tested.

7.1.12.4 The Contractor shall measure the gross start stop distortion of the test signal received at the field device under test.

7.1.12.5 After the data circuit is tested in one direction the Contractor shall input a standard test signal into the field devices tested above and shall measure the gross start stop distortion at the CDIN DCP.

7.1.12.6 The Contractor shall measure the following performance characteristics on end-to-end circuits:

7.1.12.7 Gross start stop data distortion shall not exceed 20% measured as per TIA/EIA-404-B.

7.1.12.8 While the test signal is being received during one of the stage three tests the Contractor shall disconnect one of the Data Ring Network optical fibres to the FDIN under test and shall record compliance or non-compliance with the following:

a) End-to-end data communication stops after the fibre is disconnected;

b) End-to-end data communication is restored after not more than 3 seconds per node.

7.1.12.9 The Data Ring Network optical fibre shall be reconnected to the Node. The Data Ring Network shall be reset from the CDIN and verified to have reconfigured to normal operation.

7.2 Ethernet Communication Equipment

7.2.1 The Contractor shall verify all Ethernet switch power status, link integrity on each electrical/optical port, and data activity on each electrical/optical port.

7.2.2 The Contractor shall verify redundancy of the network. The Contractor shall disconnect each switch, one at a time, and confirm no network data packet loss and no network link loss to and from all connected switches via redundant path(s).

7.2.3 The Contractor shall verify that any Ethernet switch shall be able to restore network services if any optical path is broken.

7.2.4 The Contractor shall confirm required network management diagnostics, monitoring, alarm, logging and configuration features.

7.3 Serial Over IP/Port Server Equipment

7.3.1 The Contractor shall verify all port server power status, link integrity on each electrical/optical port, and data activity on each electrical/optical port.

7.3.2 The port server shall have a packet error rate (Ethernet interface) and bit error rate (serial interface) of at least 10^{-6} when transmitting serial data at 9600 baud.

8. QUALITY ASSURANCE – Not Used

9. MEASUREMENT FOR PAYMENT – Not Used

10. BASIS OF PAYMENT

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment and Material required to do the work including the production of all drawings, text and test results.