Time Division Multiple Access (TDMA)

For more than fifteen years, Intelsat Time Division Multiple Access (TDMA) systems have delivered virtually error-free service, and have consistently outperformed other digital transmission methods. TDMA is a single carrier per transponder system. There is no inter-modulation distortion risk.

The Model 2760A exceeds the Intelsat Low Cost TDMA specification IESS-317A, often replacing as many as three racks of 1st Generation TDMA (IESS-307) equipment. The 2nd Generation TDMA system design concept is to simplify routine tasks. The Operator Console has an intuitive Graphical User Interface, displaying hardware elements for status monitoring, and control and maintenance.

The IESS-317 TDMA Terminal is designed to be about one-fifth the cost of the system it replaces. Adding the basic terrestrial interface, called a DDI (Direct Digital Interface), is easily accomplished without traffic interruption. Since there are no Intelsat specified testing requirements for adding services, it requires only BER testing with the correspondent before establishing a newly assigned revenue generating traffic service. After the initial investment of the IESS-317 terminal, the cost of adding a DDI is set by Intelsat to be less than one-half the cost of a satellite modem – and the DDI contains two E-1 interfaces. The DDI operates in a 2 Mbits/sec transparent mode for Digital Circuit Multiplication Equipment (DCME), or a Sub-Rate E-1 Mode as a standard feature. Sub Rate E-1 mode allows traffic grooming. Satellite payload to correspondent does not have to originate from the same DDI, thus saving DSX space.

Routes are assigned via a Burst Time Plan (BTP). Intelsat can add or modify routes by changing the Burst Time Plan between a pair of terminals, or controlling an entire ocean region. The BTP Change is computer controlled, and it is accomplished without disruption of traffic. The New TDMA Infrastructure upgrade signifies Intelsat’s continuing commitment to TDMA. Allowing more terminals per network, it enables the retiring of older satellite communications technologies such as analog FDM.

The Satellite Switched (SS-TDMA) payload of the 6-Series and 9-Series spacecraft enables dynamic switching of satellite beams during the TDMA frame interval. This enables multiple zones of connectivity without the need for additional link equipment, again saving system costs.

Even though the Model 2760 has been proven reliable with years of trouble free service, it has various loop tests and non-interfering traffic monitoring capabilities, implemented by the operator from the terminal console. Continually running self-diagnostics and data parity checks, the system guards against traffic interruption, and enables more simplified system troubleshooting. Faults are isolated to a single, or a pair of modules.

The L3 Communications Satellite Networks TDMA team has key personnel with years of experience in satellite communications, and with the Model 2760A, L3 Satellite Networks offers full service solutions including: system design, installation, INTELSAT testing, training, warranty repair, field service, and complete earth station upgrades (from the DDF to the antenna, including civil engineering works).
Specifications

TDMA Traffic Terminal  IESS-317A

- Frame period of 2 mSec
- Burst Transmission bit rate of 120 Mbits/sec
- Nominal Clear Sky BER of $1 \times 10^{-10}$ with FEC BCH 7/8 applied to payload
- Operates in any satellite beam coverage type (Assignments set by INTELSAT)
- QPSK modulation with coherent demodulation (CQPSK), phase locked to the TDMA System clock
- Performance monitoring of uplink and downlink data displayed with time indexed BER graphs and G.826 charts

Modem Integrated Transponder Hopping Switches

- IF Switches for multiple transponder operation incorporated into Modulator and Demodulator
- Supports four uplinks and four downlinks, in any combination of quantities (Assignments set by INTELSAT)
- Isolation >55 dB
- Co-channel isolation >55 dB
- Switching time less than 250 nSec

Terrestrial Interface

- Basic terrestrial interface: Direct Digital Interface (DDI)
- Physical and Electrical properties compliant with G.703 (75 ohms unbi. - 120 ohms bal.)
- Framed G.704 mode, regenerates outgoing frame per G.704, G.706
- Unframed 2 Mbits/sec mode completely transparent regarding data - Supports all manufacturers’ DCME
- Terrestrial clocking: Recovered satellite timing, Recovered terrestrial timing, External G.821 stable clock

Terminal Physical

- Standard rack enclosure 24/36/79 in (61/92/201 cm)
- EM I suppressive enclosure 24/40/81 in (61/102/206 cm)
- Weight approx. 450 to 700 lbs/205 to 320 kgs depending on enclosure, and level of expansion
- Card modules on plug-in Euro-standard 6U long form factor
- EIA 19 inch rack mount enclosure
- Optional CE Mark Qualified Model 2760A

Burst Mode Modulator

- IF output frequency 140 MHz
- IF output level approx. -3 dBm
- Modulator carrier level on-off ratio >50 dB
- IF output impedance 75 ohms

Burst Mode Demodulator

- Coherent demodulation / recovers clock from receive data
- Input range +2 dB to –10 dB (12 dB dynamic range)
- IF input frequency 140 MHz / 80 M Hz bandwidth
- Supports worst case carrier tolerance of ±25 kHz from nominal
- Supports burst to burst frequency variation for all series satellites
- Supports burst to burst amplitude variation of 5 dB
- IF input level -5 dBm nominal
- IF input impedance 75 ohms

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