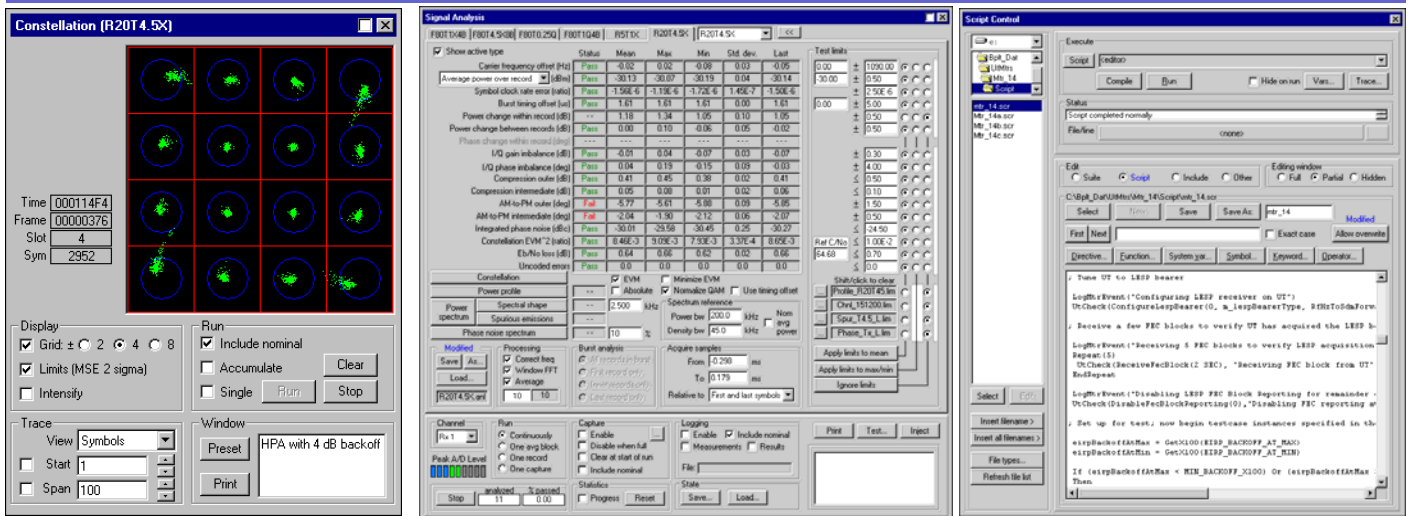




SQUARE PEG COMMUNICATIONS

BGAN Physical Layer Tester on MCP (BMCP)



OVERVIEW

SPECIFICATIONS

Square Peg Communications Inc.'s BGAN Physical Layer Tester (BPLT) is a software application that supports the testing of physical layer performance and protocol implementation of Radio Access Nodes (RANs) and User Terminals (UTs) implementing Inmarsat's Broadband Global Area Network (BGAN), FleetBroadband or SwiftBroadband services. The version of BPLT that runs on Square Peg's generic MCP-based Physical Layer Tester (PLT-M) platform is referred to as BMCP.

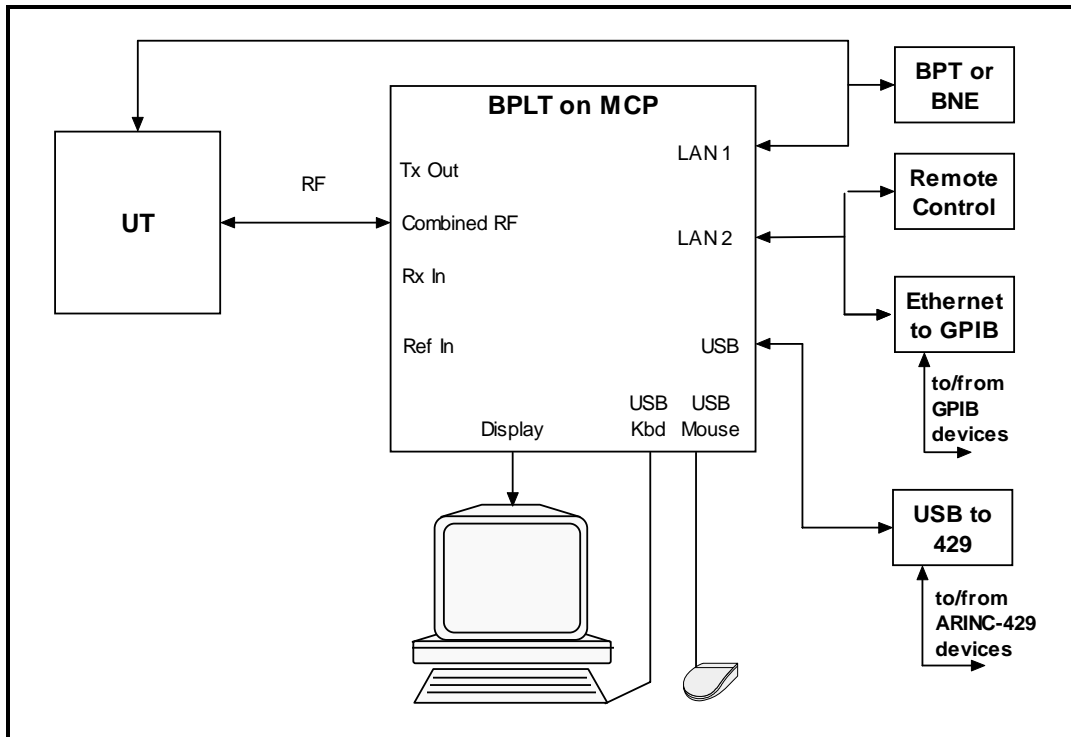
BMCP supports all of the BGAN and BGAN-X channel types and includes built-in channel simulation and signal analysis capabilities for testing of receive and transmit physical layers. An Ethernet interface allows various options for control of or by BMCP.

BMCP is a powerful and flexible test tool but is easy to use. A familiar Windows based user interface provides easy access to test functions, while a powerful scripting language allows every feature of the BMCP and equipment under test to be exercised in automated test cases and suites.

An associated suite of scripts has also been developed to facilitate automated testing of applicable Inmarsat BGAN UT physical layer Mandatory Test Requirements (MTRs).

TRANSMIT CAPABILITIES

- | | |
|---------------------|--|
| Physical channels | 4 simultaneous; 1-4 bearers per physical channel depending upon bearer type |
| Channel types | LESP (8.4, 33.6, 84, 168 ksym/s QPSK; 33.6, 84, 151.2, 168 ksym/s 16-QAM; 84, 168 ksym/s 32-QAM; 84, 168 ksym/s 64-QAM)
MESP (16.8, 33.6, 67.2, 151.2 ksym/s $\pi/4$-QPSK; 33.6, 67.2, 151.2 ksym/s 16-QAM; 5, 20 or 80 ms bursts as applicable) |
| Channel impairments | Test tones (CW, two-tone, etc.) and raw samples
Independently-specifiable parameters: <ul style="list-style-type: none"> ▪ Fixed carrier frequency error, burst frequency jitter ▪ Doppler rate, peak offset ▪ Navigation-based Doppler and path delay ▪ Reacquisition carrier offset ▪ ACI level and frequency offset ▪ CCI level ▪ I/Q gain and phase imbalance ▪ Continuous phase noise spectrum, level ▪ Discrete phase noise level, frequency offset ▪ Fading model, bandwidth(s), C/M ratio, differential delay(s), path Doppler(s) ▪ Phase and/or amplitude doppler distribution, magnitude, interval ▪ Signal blockage (helicopter) ▪ Transmission path delay, burst timing jitter ▪ Symbol rate error ▪ HPA non-linearity ▪ AWGN |



BMCP CONFIGURATION FOR UT TESTING
(Not all components are required for all test applications)

RECEIVE CAPABILITIES

Physical channels	4 simultaneous
Channel types	LESP (as per transmitter) MESP (as per transmitter) Unframed
Channel modes	Analysis (auto-identification of burst types, optimized for transmitter performance testing) SDM (fully compliant performance in noise)
Signal analysis	Signal capture (raw samples and soft decisions) Signal replay (from raw samples) Selectable pass/fail limits for measurements: <ul style="list-style-type: none"> ▪ Carrier frequency offset ▪ Average power, power rate of change ▪ Phase change ▪ Integrated phase noise ▪ Burst timing offset ▪ Symbol clock rate error ▪ I/Q gain and phase imbalance ▪ Constellation mean-squared error, EVM ▪ HPA compression and AM/PM ▪ Eb/No loss ▪ Uncoded errors ▪ Power profile ▪ Spectral shape ▪ Out-of-band emissions ▪ Phase noise spectrum

ETHERNET INTERFACE CAPABILITIES

Medium	10/100/1000BaseT
Functionality	Protocol Tester interface, remote control interface, UT control interface, voice codec interface, GPIB interface (with Ethernet-to-GPIB converter), ARINC-429 interface (with Ethernet-to-429 or USB-to-429 converter)

LOGGING CAPABILITIES

General	Protocol Tester interface messages Transmitted/received user or channel data Test sequence progress and outcome System events, faults, and abnormal conditions
Signal analysis	Signal analysis measurements Signal analysis statistics Raw input samples Demodulator soft decisions

SCRIPT CAPABILITIES

General	Procedure-based (like Basic, C or Pascal) Functions for string processing, math, user interaction, logging, I/O (serial, TCP/IP, GPIB) Integrated development environment
BPLT-specific	Configuring and controlling modems Sending and receiving user data Controlling channel simulator Sending and receiving BPT and UT messages



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