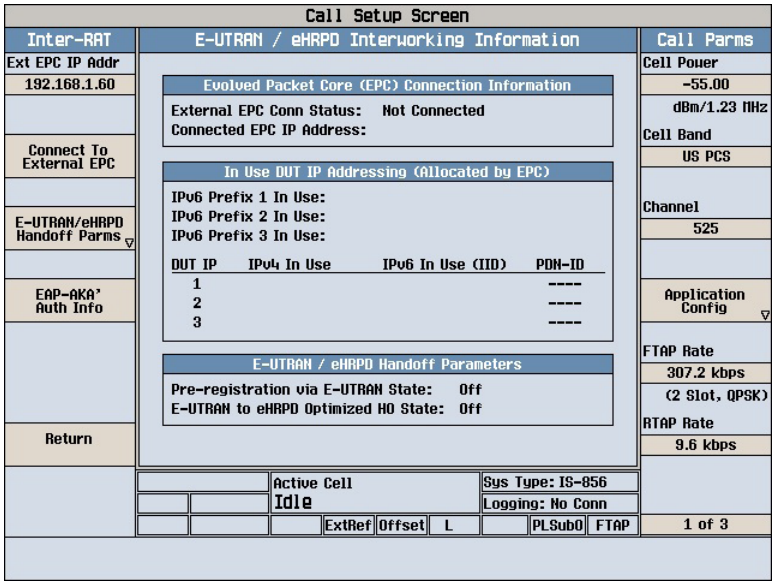
Keysight Technologies
E6706G 1xEV-DO Lab Application
For the 8960 Series 10 (E5515C/E) Wireless Communications Test Set

Technical Overview



KEYSIGHT TECHNOLOGIES

Achieve reliable high data rate testing results and gain confidence in your 1xEV-DO wireless access terminals

As the first one box test set solution to support 1xEV-DO, 1xEV-DO Release A, Release B, and eHRPD, the Keysight Technologies, Inc. E6706G 1xEV-DO lab application in conjunction with the 8960 Series 10 (E5515C/E) wireless communications test set provides a wide range of parametric and functional test capabilities for 1xEV-DO. The E6706G is designed for use in many stages of the mobile device development lifecycle, with the capacity to meet both RF and functional testing needs. This test solution improves the problem-solving efficiency of R&D engineers who design, integrate, verify, and validate leading-edge 1xEV-DO wireless access terminals (ATs).

Key Features

- Supports 1xEV-DO Release 0 and Release A default packet application for IP-based application test and verification
- Supports 1xEV-DO Release 0 FTAP/RTAP, Release A FETAP/RETAP, and Release B FMCTAP and RMCTAP call processing for accurate physical layer performance qualifications
- Release B functionality for testing access terminals that support multicarrier operation and the new subtype 3 physical layer used in 1xEV-DO Release B
- Release A default packet application support enables data throughput testing with speeds up to 3.1 Mbps on the forward link and 1.8 Mbps on the reverse link
- Protocol logging with the included wireless protocol advisor PC software provides detailed logs at multiple layers in the 1xEV-DO protocol stack for quick debugging of protocol issues
- High precision, all digital I/Q baseband fading using the Keysight external Baseband Studio solution (requires incremental hardware) provides all defined fading profiles for 1xEV-DO with digital repeatability and accuracy
- Basic mobile IP support in the test set is enabled in the E6706G. Full mobile IP protocol test support through use of the Software Concepts MOB-IP-SIM with the E6706G lab application
- IS-856 test mode allows receiver and transmitter testing without call processing
- Keysight two-box solution (the new Keysight E7515A UXM wireless test platform, and E5515C/E) supports non-optimized/optimized handover from LTE to eHRPD with enhanced eHRPD functionality

What's New?

- Settable UATI and UATI subnet mask
- Two additional settable P-CSCP IP addresses
- Six additional frequency bands for 1xEV-DO

E6706G Functionality Overview

Standardized over-the-air protocol connections

The E6706G 1xEV-DO lab application includes call processing that supports the standardized over-the-air protocols. The 1xEV-DO lab application offers the default packet application used in actual networks for Release 0 and Release A as well as the test application (FTAP/RTAP, FETAP/RETAP, FMCTAP, RMCTAP) used for parametric tests for the 1xEV-DO Release 0, Release A, and Release B air interfaces.

The default packet application emulates the actual 1xEV-DO network by providing data connectivity from the TCP/IP layer (via the rear panel LAN connector) to the access terminal. Sustained data throughput rates can reach full data rates of 3.1 Mbps to an AT and 1.8 Mbps from the AT for the E5515C/E mainframe. The E6706G supports simple IP and basic mobile IP connections and, when combined with the Software Concepts MOB-IP-SIM, provides full mobile IP support.

The 1xEV-DO test application protocols allow quick and efficient control of the forward and reverse operation for accurate parametric testing. FTAP/FETAP/FMCTAP provides packet error rate (PER) measurement capability for RF connections up to 3.1 Mbps. RTAP/RETAP/RMCTAP provides the ability to control the AT's reverse link to test such parameters as code domain power and waveform quality at all of the available reverse data rates.

eHRPD support

To prepare networks for interoperation with future LTE implementations, the 3GPP2 standard committee has developed a new version of the 1xEV-DO upper layer protocol stack known as eHRPD. This modified stack provides the upper layer protocols compatible with the 3GPP EPC. This capability will eventually drive handovers between LTE and 1xEV-DO. The eHRPD implementation in the 8960 Series 10 builds upon the existing 1xEV-DO packet data foundation of full throughput MFPA, EMPA, and RoHC (robust header compression). Working together with the Keysight E7515A, E6706G on E5515C/E supports non-optimized handover from LTE to eHRPD. The following features are available on the E6706G lab application:

- Support for LTE neighbor list setup
- Support for HSGW context and other settings
- Prior session restore
- PDN naming settings for eHRPD
- Support for network-initiated VSNCP re-sync for IPv4 and IPv6
- Message to UE for eHRPD test cases
- Enable/Disable router advertisement message

E6706G Functionality Overview (continued)

Release A test support

The E6706G supports testing of the 1xEV-DO Release A physical subtype 2 air interface using the enhanced test application protocol. Call processing with this new air interface is simple and easy using one button commands, just like it is with the existing Release 0 functionality. The E6706G supports all of the new forward traffic channel configurations and enables accurate PER testing under realistic conditions using the FETAP protocol (forward enhanced test application protocol). Using the new RETAP protocol (reverse enhanced test application protocol), all of the new subtype 2 reverse channel packet sizes and modulation types are easily tested for such parameters as power, waveform quality, code domain power, and conducted spurious emissions.

Release B test support

The E6706G supports testing of the 1xEV-DO Release B physical subtype 3 air interface using the multi-carrier test application protocol. Release B allows user traffic to flow over more than one carrier, which significantly improves data rates. Up to three E5515C/E instruments with the E6706G application (one per carrier) can be synchronized together to perform Release B multi-carrier testing, or one box can be used for multiple carriers in factory test mode only. Using the multi-carrier test application protocol, the 8960 Series 10 test solution supports Tx measurements including waveform quality and frequency accuracy, maximum RF output power, and conducted spurious emissions. Supported Rx measurements include demodulation of forward traffic channel in AWGN, receiver sensitivity and dynamic range.

Hybrid mode

When combined with another E5515C/E running the E6702G cdma2000® lab application, the E6706G 1xEV-DO lab application supports cdma2000/1xEV-DO hybrid mode operation. The built-in multi-unit synchronization capability allows the two units to be synchronized on CDMA system time to allow for hybrid mode call processing and functional test.

Mobile IP

Basic mobile IP support has been added to the E6706G application that enables the AT to pass mobile IP negotiation. Complete mobile IP and data session handoff tests require the addition of the Software Concepts Inc MOB-IP-SIM. Together, the E6706G, E5515C/E, and the MOB-IP-SIM provide a powerful solution for verifying the AT's mobile IP protocol behaviors.

Fading tests

Option 004 adds a rear panel digital bus that enables fading when used with Keysight's N5106A PXB baseband generator and channel emulator. This solution provides receiver fading tests with unprecedented accuracy and repeatability at a very attractive price point. Baseband I/Q data from the E5515C/E is sent via the digital bus to the PXB, where real-time fading is applied based on user-selected fading profiles. After digital fading, AWGN can be digitally added to the waveform. The resulting waveform is then returned to the test set via the digital bus for modulation. This solution eliminates almost all associated calibrations and provides consistent repeatability.

E6706G Functionality Overview (continued)

Protocol logging

The wireless protocol advisor PC software included with the E6706G 1xEV-DO lab application opens the ability to log and analyze protocol messages sent between the test set and AT. Besides the ability to capture specific events or messages, the wireless protocol advisor allows you to build customized filters to capture and analyze just the information you want. Messages can be examined from the following protocol layers: forward and reverse SLP-D, forward and reverse TAP, forward and reverse RLP, forward and reverse PPP, and forward and reverse IP layer. Captured data, as well as any customized triggers and filters, can be stored for future use. With this powerful protocol logging capability, you can quickly track down issues in the protocol stack of your 1xEV-DO access terminal.

1xEV-DO test mode support

Receiver test without active call processing is supported in the E6706G 1xEV-DO lab application through the IS-856 test mode. In test mode, the E6706G provides an accurate 1xEV-DO Release 0/A/B forward link signal that allows access terminals supporting test mode operation to achieve time alignment. At this point, the AT can be directed to demodulate the forward traffic channel that is continuously transmitted by the test set. The packet error rate of the AT can then be read from the AT using the AT's test mode control software. In addition, AT transmitter measurements such as channel power, Tx spurious emissions, and time response of open loop power can be made in test mode.

Easy upgrade for existing CDMA-capable 8960 Series 10 test sets

Units that support the CDMA applications, like the E6702G, can easily be upgraded to support 1xEV-DO test capabilities. Using the latest lab application features on existing E5515C units may require purchasing hardware upgrade(s).

E6706G Functionality Overview (continued)

1xEV-DO call processing

- UATI assign
- Session close
- Connect
- FTAP/FETAP/FMCTAP support
- Channel handoff
- Release 0 default packet application
- MFPA
- EMPA
- Fast dormancy timer
- Enhanced EMPA
- RoHC (robust header compression)
- IPv4, IPv6, IPv4+IPv6
- Session open
- Session negotiation
- Disconnect
- RTAP/RETAP/RMCTAP support
- Band handoff
- VSNCP enhancement

Tx measurements

- Average power
- Code domain power
- Modulation quality
- Spectrum monitor
- Tx dynamic power measurement
- Fast device tune measurement
- Channel power
- Access probe power
- Time response of open loop power
- Tx spurious emissions
- Graphical access probe power

Rx measurements

- FTAP loopback
- Sensitivity
- PER with AWGN
- Data throughput
- FETAP loopback
- Dynamic range
- PER with fading (optional fader)
- Data rate histogram

Technical Specifications

These specifications apply to the E5515E, or E5515C mainframe with Option 003 installed, when used with the latest shipping version of the E6706G lab application. These applications also include functionality described within the E1966A 1xEV-DO test application data sheet. For details visit **www.keysight.com/find/E1966A**.

Specifications describe the test set's warranted performance and are valid over the entire operation and environmental ranges unless otherwise noted. All specifications are valid after a 30-minute warm-up period of continuous operation.

Supplemental characteristics are intended to provide additional information useful in applying the instrument by giving typical, but non-warranted performance parameters. These characteristics are shown in italics and labeled as typical. All units shipped from the factory meet these typical numbers at 25 °C ambient without including measurement uncertainty.

Additionally, these specifications also apply to an E5515C/E mainframe with Option 003 running the latest shipping version of the E6706U lab application over the 25 °C ±5 °C ambient temperature range. The E6706U operating conditions are 0 to 35 °C.

1xEV-DO call processing functionality

Resident formats	**1xEV-DO**
Call processing timing tolerance	*Mobile transmissions must be typically within ±6 µs of test set's transmitted pilot channel clock timing for proper reverse channel acquisition*
Overhead messages	Sync message with real-time long code and system time update, quick configuration message, sector parameters message, and access parameters message
Protocol stack	1xEV-DO Release 0, Release A, or Release B using test application protocol (TAP/FTAP/RTAP, ETAP/FETAP/RETAP, or MCTAP/FMCTAP/RMCTAP, respectively), default packet application protocol for Release 0 and Release A, and Multi-Flow Packet Application for Release A
Base station parameters	ACK channel gain, DRC channel gain, data offset nom, data offset 9k6, data offset 19k2, data offset 38k4, data offset 76k8, and data offset 153k6
Enhanced idle state protocol	Supports user-settable slot cycles to be set ranging from 0.1066 to 40.96 seconds
R-DRC fixed mode attribute	On or Off. Default of On. When in the On state, the test set transmits the user-set forward traffic rate. When in the off state, the test set transmits the forward configuration per the received DRC value transmitted by the AT

1xEV-DO default packet application

Default packet application	
Protocol stack	1xEV-DO Release 0 and Release A
Default packet application operation	Allows the test set to emulate a complete data network by providing transparent connectivity to a 1xEV-DO AT. Supports simple IP and mobile IP connections. Requires that the test be connected to an external server via the rear panel LAN connector
R-DRC channel mode	Test set decodes the R-DRC and changes the forward traffic channel to match the requested rate
DRC length	User-settable to 2, 4, or 8 slots
Early termination	Supported in the forward link
AT directed packets	Test set automatically directs the forward traffic channel to another MAC address that is not in use if there are no packets received via the LAN to send to the AT under test
Data rate	Supports all forward rates from 38.4 kbps to 3.1 Mbps. Connected AT dynamically selects the actual data rate used. Supports all reverse rates from 9.6 kbps to 1.8 Mbps. Connected AT dynamically selects the actual data rate used
Data over signaling in the reverse link	Supports voice data in the signaling message on the control channel from the AT
Dormant mode	Supported
RLP control counters	Provides counters for forward and reverse reset messages, NAK messages, and NAKKed octets
RLP data counters	Provides counters for forward and reverse new octets, retransmitted octets, and packets
IP data counters	Provides counters for forward and reverse bytes and packets
Forward traffic data counters	Provides counters for the number of packets transmitted at the following configurations as commanded by the AT: 38.4 kbps 16 slots, QPSK (DRC = 0x1) 76.8 kbps 8 slots, QPSK (DRC = 0x2) 153.6 kbps 4 slots, QPSK (DRC = 0x3) 307.2 kbps 2 slots, QPSK (DRC = 0x4) 307.2 kbps 4 slots, QPSK (DRC = 0x5) 614.4 kbps 1 slot, QPSK (DRC = 0x6) 614.4 kbps 2 slots, QPSK (DRC = 0x7) 921.6 kbps 2 slots, 8PSK (DRC = 0x8) 1228.8 kbps 1 slot, QPSK (DRC = 0x9) 1228.8 kbps 2 slot, 16QAM (DRC = 0xA) 1843.2 kbps 1 slot, 8PSK (DRC = 0xB) 2457.6 kbps 1 slot, 16QAM (DRC = 0xC) Total number of packets directed to the AT Total number not directed to the AT
Reverse traffic data counters	Provides counters for the number of packets transmitted at the following rates: 9.6 kbps 19.2 kbps 38.4 kbps 78.6 kbps 153.6 kbps

1xEV-DO default packet application (continued)

Default packet application (continued)	
IP throughput monitor	Displays a graph of the data throughput for forward and reverse packets at the IP layer, and at the RLP layer
IP throughput numeric results	Provides numeric results for the current, average, and peak data rates in bits per second as well as total number of bytes transferred for forward and reverse IP packets and forward and reverse OTA (over-the-air-RLP) packets
IP throughput display axis controls	
Time span	0 to 600 seconds
Start data rate	0 to 4999 kbps
Stop data rate	0 to 5000 kbps
IP throughput trace controls	On/Off function and marker function for IP Tx trace, IP Rx trace, OTA (RLP) Tx trace, and OTA (RLP) Rx trace
IP throughput graph controls	Clear display and freeze display
Ping function	Allows the user to test network connections required for default packet capability. Reports number of packets transmitted, number of packets received, percent lost, and round trip time minimum/average/maximum
Mobile IP support	The E6706G supports two solutions for mobile IP support. The first is basic functionality that does not require any external devices. The 8960 Series 10 processes the reverse mobile IP related messages and generates corresponding forward mobile IP messages in order for the AT to pass mobile IP registration. The second solution provides support for Software Concepts Inc's mobile IP simulator models MIP-5800 MOB-IP-SIM or MIP-5850 MOB-IP-SIM. User control for internal simple IP support or external mobile IP support for default packet operation. Interfaces to the mobile IP simulator through the test set's LAN port. When in external mobile IP mode, the test set sends the data out through the LAN port in PPP over Ethernet format
Mobile IP functions	
Internal mobile IP state	Sets whether simple IP or mobile IP is used. Settable to On or Off. External PDSN state must be set to Off for this to take effect
Home agent shared secret (Hex)	Sets the secret key used in mobile IP authentication procedure. Must match the MN-HA (mobile node – home agent) secret programmed by the AT
External PDSN state	On or Off. When On, outputs PPP data via the LAN connector to the external MIP-5800 or MIP-5850 mobile IP simulators
External PDSN IP address	Accepts IPv4 standard address
External PDSN TCP port	0 to 65535
Instrument IP addresses	IPv6 prefix, IPv6 default router address
User parameters	IPv6 link-local prefix, LAN IPv6 IID (derived from MAC ID), LAN
Displays	2 IPv6 IID (derived from MAC ID)
Data channel addresses	
Data channel parameters	DUT IPv6 DNS server prefix, DUT IPv6 DNS server IID, DUT IPv6 P-CSCF server (SIP proxy) prefix, and DUT IPv6 P-CSCF
DUT IPv6 IID	server (SIP proxy) IID automatically set by the test set, no user entry

1xEV-DO multi-flow packet application

Multi-flow packet application	
Protocol stack	1xEV-DO Release A only
Multi-flow packet application operation	Allows the test set to emulate a complete data network by providing transparent connectivity to a 1xEV-DO AT. Supports multiple IP flows in both the forward and reverse links to support quality of service. Requires that the test be connected to an external server via the rear panel LAN connector
Air interface support	Supports all physical layer subtype 2 parameters and functionality
IP flows	Supports up to 16 forward and reverse IP flows
RLP flows	Supports 5 forward RLP flows and 5 reverse RLP flows
RTC MAC subtype 3 flows	Supports 4 user-configurable RTCMAC subtype 3 flows
Mapping rules	Supports a default mapping rule and 6 user-configurable mapping rules. When a phone requests an IP flow, the test set searches the user-defined mapping rules to find a match for the requested profile ID. If a match is found, then the test set maps the IP flow according to the user-defined rule. If no match is found, the test set applies the default rule and maps the IP flow to the best effort flow
Forward mapping rule parameters	For each of the 6 user-configurable mapping rules: User settable profile ID (hex input), RLP flow mapping (RLP flow 0 through 4), reservation idle state behavior (no change, close with connection, or follow connection), and AN scheduler priority (0 through 7 with 0 being the lowest priority)
Reverse mapping rule parameters	For each of the 6 user-configurable mapping rules: User settable profile ID (hex input), RLP flow mapping (RLP flow 0 through 4), and reservation idle state behavior (no change, close with connection, or follow connection)
Forward RLP flow parameters	For each of the 5 RLP flows: MFPA NAK enable (on or Off), MFPA abort timer (ms), MFPA flush timer (ms), MFPA header size (14 or 22 bits), MFPA RLP ID (binary)
Reverse RLP flow parameters	For each of the 5 RLP flows: MFPA NAK enable (On or Off), MFPA physical layer NAK enable (On or Off), MFPA abort timer (ms), MFPA flush timer (ms), MFPA header size (14 or 22 bits), MFPA RLP ID (binary), MFPA RTC MAC flow mapping (flows 1 through 4), and MFPA data over signaling allowed (On or Off)
Data throughput monitor	Supports four user-definable data throughput monitor (DTM) contexts in both the forward and reverse links that can be assigned to any of the mapping rules. Each context appears on the data throughput monitor as a trace allowing analysis of data throughput for a specific IP flow
Session application pre-configurations	Supports four pre-configurations that set all related MFPA parameters of specific applications: Preset values (return to power-up state), IS-856 protocol default values, MFPA maximum throughput best effort with video telephony at 64 kbps, and MFPA best effort with video telephony at 64 kbps
Traffic channel MAC pre-configurations	Supports for each of the 4 RTC MAC subtype 3 flows the following pre-configurations: Preset with maximum throughput, IS-856 protocol default values, SIP/RTCP, video 64 kbps, audio for video at 64 kbps, best effort, gaming, and voice over IP

1xEV-DO multi-flow packet application (continued)

Multi-flow packet application (continued)	
Session application pre-configurations	Supports four pre-configurations that set all related MFPA parameters of specific applications: Preset values (return to power-up state), IS-856 protocol default values, MFPA maximum throughput best effort with video telephony at 64 kbps, MFPA best effort with video telephony at 64 kbps
Forward traffic MAC parameters	DRC supervision timer, and minimum continuation span
RTC MAC non-flow parameters	Number of RTC MAC flows, merge threshold, payload threshold, pilot strength filter time constant, T2P no Tx filter time constant, TxT2P, pilot strength axis 0 value, TxT2P maximum pilot strength axis 0, pilot strength axis 1 value, TxT2P maximum pilot strength axis 1, pilot strength axis 2 value, TxT2P maximum pilot strength axis 2, permitted payload 0 sub-frame 1, permitted payload 0 sub-frame 2, permitted payload 0 sub-frame 3, permitted payload 128 sub-frame 1, permitted payload 128 sub-frame 2, permitted payload 128 sub-frame 3, permitted payload 256 sub-frame 1, permitted payload 256 sub-frame 2, permitted payload 256 sub-frame 3, permitted payload 512 sub-frame 1, permitted payload 512 sub-frame 2, permitted payload 512 sub-frame 3, permitted payload 768 sub-frame 1, permitted payload 768 sub-frame 2, permitted payload 768 sub-frame 3, permitted payload 1024 sub-frame 1, permitted payload 1024 sub-frame 2, permitted payload 1024 sub-frame 3, permitted payload 1536 sub-frame 1, permitted payload 1536 sub-frame 2, permitted payload 1536 sub-frame 3, permitted payload 2048 sub-frame 1, permitted payload 2048 sub-frame 2, permitted payload 2048 sub-frame 3, permitted payload 3072 sub-frame 1, permitted payload 3072 sub-frame 2, permitted payload 3072 sub-frame 3, permitted payload 4096 sub-frame 1, permitted payload 4096 sub-frame 2, permitted payload 4096 sub-frame 3, permitted payload 6144 sub-frame 1, permitted payload 6144 sub-frame 2, permitted payload 6144 sub-frame 3, permitted payload 8192 sub-frame 1, permitted payload 8192 sub-frame 2, permitted payload 8192 sub-frame 3, permitted payload 12288 sub-frame 1, permitted payload 12288 sub-frame 2, and permitted payload 12288 sub-frame 3
Flow NN simple parameters	Provides for each RTC MAC sub-type 3 flow: Merge threshold, maximum T2P inflow, minimum T2P inflow, T2P filter time constant, maximum bucket level, burst duration factor, and transmission mode

1xEV-DO multi-flow packet application (continued)

Multi-flow packet application (continued)	
Flow NN complex parameters	Provides for each RTC MAC sub-type 3 flow: Bucket factor T2P axis number (1 to 3), bucket factor FRAB axis number (1 to 3), bucket factor T2P axis 00 value, bucket factor T2P axis 01 value, bucket factor FRAB axis 0 value, bucket factor FRAB axis 1 value, bucket factor FRAB axis 2 value, bucket factor T2P axis 00 FRAB axis 0, bucket factor T2P axis 00 FRAB axis 1, bucket factor T2P axis 00 FRAB axis 2, bucket factor T2P axis 01 FRAB axis 0, bucket factor T2P axis 01 FRAB axis 1, bucket factor T2P axis 01 FRAB axis 2, T2P transition function T2P axis number, T2P transition function FRAB axis number, T2P transition function T2P axis 00 value, T2P transition function T2P axis 01 value, T2P transition function T2P axis 02 value, T2P transition function T2P axis 03 value, T2P transition function FRAB axis 0 value, T2P transition function FRAB axis 1 value, T2P transition function FRAB axis 2 value, T2P transition function FRAB axis 3 value, T2P up T2P axis 00 FRAB axis 0, T2P up T2P axis 00 FRAB axis 1, T2P up T2P axis 00 FRAB axis 2, T2P up T2P axis 00 FRAB axis 3, T2P up T2P axis 00 FRAB axis 4, T2P up T2P axis 01 FRAB axis 0, T2P up T2P axis 01 FRAB axis 1, T2P up T2P axis 01 FRAB axis 2, T2P up T2P axis 01 FRAB axis 3, T2P up T2P axis 01 FRAB axis 4, T2P up T2P axis 02 FRAB axis 0, T2P up T2P axis 02 FRAB axis 1, T2P up T2P axis 02 FRAB axis 2, T2P up T2P axis 02 FRAB axis 3, T2P up T2P axis 02 FRAB axis 4, T2P up T2P axis 03 FRAB axis 0, T2P up T2P axis 03 FRAB axis 1, T2P up T2P axis 03 FRAB axis 2, T2P up T2P axis 03 FRAB axis 3, T2P up T2P axis 03 FRAB axis 4, T2P down T2P axis 00 FRAB axis 0, T2P down T2P axis 00 FRAB axis 1, T2P down T2P axis 00 FRAB axis 2, T2P down T2P axis 00 FRAB axis 3, T2P down T2P axis 00 FRAB axis 4, T2P down T2P axis 01 FRAB axis 0, T2P down T2P axis 01 FRAB axis 1, T2P down T2P axis 01 FRAB axis 2, T2P down T2P axis 01 FRAB axis 3, T2P down T2P axis 01 FRAB axis 4, T2P down T2P axis 02 FRAB axis 0, T2P down T2P axis 02 FRAB axis 1, T2P down T2P axis 02 FRAB axis 2, T2P down T2P axis 02 FRAB axis 3, T2P down T2P axis 02 FRAB axis 4, T2P down T2P axis 03 FRAB axis 0, T2P down T2P axis 03 FRAB axis 1, T2P down T2P axis 03 FRAB axis 2, T2P down T2P axis 03 FRAB axis 3, T2P down p T2P axis 03 FRAB axis 4

1xEV-DO enhanced multi-flow packet application

Enhanced multi-flow packet application	
Protocol stack	1xEV-DO Release A only
Enhanced multi-flow packet application operation	Allows the test set to emulate a complete data network by providing transparent connectivity to a 1xEV-DO AT. In EMPA the test set supports multiple IP flows in both the forward and reverse links with RoHC and quality of service. Requires that the test be connected to a external servers (SIP and application) via the rear panel LAN connector
Air interface support	Supports all physical layer subtype 2 parameters and functionality
IP flows	Supports up to 16 forward and reverse IP flows
RLP flows	Supports 5 forward RLP flows and 5 reverse RLP flows
RTC MAC subtype 3 flows	Supports 4 user-configurable RTCMAC subtype 3 flows
Forward mapping rule parameters	For each of the 6 user-configurable mapping rules: User settable profile ID (hex input), RLP flow mapping (RLP flow 0 through 4), reservation idle state behavior (no change, close with connection, or follow connection), and AN scheduler priority (0 through 7 with 0 being the lowest priority)
Reverse mapping rule parameters	For each of the 6 user-configurable mapping rules: User settable profile ID (hex input), RLP flow mapping (RLP flow 0 through 4), and reservation idle state behavior (no change, close with connection, or follow connection)
Forward link flow parameters	For each of the 5 RLP flows: EMPA NAK enable (On or Off), EMPA abort timer (ms), EMPA flush timer (ms), EMPA sequence length (6, 14, or 22 bits), EMPA data configuration (HDLC framing, packet/octet, or packet/packet), EMPA out of order delivery allowed (Off or On)
Reverse link flow parameters	For each of the 5 RLP flows: EMPA NAK enable (On or Off), EMPA physical layer NAK enable (On or Off), EMPA transmit abort timer specified state (not specified or specified), EMPA transmit abort timer (ms), EMPA abort timer (ms), EMPA flush timer (ms), EMPA sequence length (6, 14, or 22 bits), EMPA data configuration (HDLC framing, packet/octet, or packet/packet), EMPA RTC MAC flow mapping (flows 1 through 4), and EMPA data over signaling allowed (On or Off)
Robust header compression (RoHC)	Supports for forward link flows 2, 3, and 4: Max CID, large CID state, maximum reconstructed reception unit (MRRU), profile count, profile 1, profile 2, profile 3 Supports for reverse link flows 2, 3, and 4: ROHC mode (O-Mode, R-Mode, or U-Mode), max CID, large CID state, maximum reconstructed reception unit (MRRU), timer based compression state, profile count, profile 1, profile 2
Data throughput monitor	Supports four user-definable data throughput monitor (DTM) contexts in both the forward and reverse links that can be assigned to any of the mapping rules. Each context appears on the data throughput monitor as a trace allowing analysis of data throughput for a specific IP flow
Session application pre-configurations	Supports five pre-configurations that set all related EMPA parameters of specific applications: Preset values (return to power-up state), IS-856 protocol default values, EMPA maximum throughput best effort with video telephony at 64 kbps, EMPA best effort with video telephony at 64 kbps, and EMPA VoIP

1xEV-DO enhanced multi-flow packet application (continued)

Enhanced multi-flow packet application (continued)	
Traffic channel MAC pre-configurations	Supports each of the 4 RTC MAC subtype 3 flows the following pre-configurations: Preset with maximum throughput, IS-856 protocol default values, SIP/RTCP, video 64 kbps, audio for video at 64 kbps, best effort, gaming, and voice over IP
Forward traffic MAC parameters	DRC supervision timer and minimum continuation span
RTC MAC non-flow parameters	Same as listed under MFPA
Flow NN simple parameters	Same as listed under MFPA
Flow NN complex parameters	Same as listed under MFPA

1xEV-DO alternate enhanced multi-flow packet application

Alternate enhanced multi-flow packet application	
Protocol stack	1xEV-DO Release A only
Alternate enhanced multi-flow packet application operation	Allows the test set to emulate a complete eHRPD data network by providing transparent connectivity to a 1xEV-DO AT. In alternate EMPA (eHRPD) mode, the test sets the FlowNN protocol ID to 7. In this mode the test set supports the new VSNCP protocol and internal eAN/ePCF plus HSGW functions. In alternate EMPA mode the test set supports multiple IP flows in both the forward and reverse links with RoHC and quality of service. Requires that the test be connected to a external servers (SIP and application) via the rear panel LAN connector
Air interface support	Supports all physical layer subtype 2 parameters and functionality
IP flows	Supports up to 16 forward and reverse IP flows
RLP flows	Supports 5 forward RLP flows and 5 reverse RLP flows
RTC MAC subtype 3 flows	Supports 4 user-configurable RTCMAC subtype 3 flows
Forward mapping rule parameters	Same as listed under EMPA
Reverse mapping rule parameters	Same as listed under EMPA
Forward link flow parameters	Same as listed under EMPA
Reverse link flow parameters	Same as listed under EMPA
Robust header compression (RoHC)	Same as listed under EMPA
Data throughput monitor	Same as listed under EMPA
Session application pre-configurations	Same as listed under EMPA
Traffic channel MAC pre-configurations	Same as listed under EMPA P
Forward traffic MAC parameters	DRC supervision timer and minimum continuation span
RTC MAC non-flow parameters	Same as listed under MFPA
Flow NN simple parameters	Same as listed under MFPA
Flow NN complex parameters	Same as listed under MFPA
EAP-AKA' parameters	
Authentication state	On or Off (default)
Authentication key (K) (hex)	32 hex character user input with default value of "4147494C454E5420544543484E4F0000"
Operator variant algorithm config field (OP) (hex)	32 hex character user input with default value of "00000000000000000000000000000000"
Authentication management field (AMF) (hex)	4 hex character user input with default value of "8000"
Reset authentication SQN	User command to reset the SQN value

Hybrid mode functionality

(Requires two units, one running the E6706G 1xEV-DO lab application and one running the E6702G cdma2000 lab application. Units must be synchronized using the multiple unit sync feature.)

Hybrid mode	
Functionality	Supports cdma2000/1xEV-DO hybrid mode operation when used with an E5515C/E running the E6702G cdma2000 lab application. Requires that the two units are synchronized using the multi-unit synchronization capability
Basic hybrid mode test capabilities	– Hybrid mode system acquisition – 1xEV-DO power save mode – Preferred control channel cycle negotiation – Dual-idle operation on CDMA and 1xEV-DO – CDMA voice call origination in dual-idle state – CDMA voice call origination in dormant 1xEV-DO state – CDMA voice call origination in 1xEV-DO connected state – CDMA voice call termination in dual-idle state – CDMA voice call termination in CDMA idle/1xEV-DO dormant state – CDMA voice call termination in 1xEV-DO connected state – SMS origination in dual-idle state – SMS origination in CDMA idle/1xEV-DO dormant state – SMS origination in 1xEV-DO connected state – SMS termination in dual-idle state – SMS termination in CDMA idle/1xEV-DO dormant state – SMS termination in 1xEV-DO connected state – 1xEV-DO packet data call origination in dual-idle state – 1xEV-DO packet data call re-origination in 1xEV-DO dormant state – 1xEV-DO packet data call termination in 1xEV-DO dormant state – CDMA packet data call when 1xEV-DO service is unavailable
Advanced hybrid mode test capabilities (requires the use of the Software Concepts MOB-IP-SIM)	– MIP call when using static home IP – MIP call when using dynamic home IP – MIP to SIP fallback if MIP call fails while trying packet data call on 1xEV-DO – MIP to SIP fallback if MIP call fails while trying packet data call on CDMA – Active 1xEV-DO to CDMA data session handoff – Dormant 1xEV-DO to CDMA data session handoff – Dormant CDMA to 1xEV-DO data session handoff – 1xEV-DO to CDMA to 1xEV-DO data session hand-back

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