EV-DO Rel 0 (DOr0) Development and Conformance Test System

(CDMA-AIME Option 6204-101 or 6402-101)

AEROFLEX
A passion for performance.

- Provides EV-DO Release 0 protocol test capability for the CDMA-AIME System
- Software only upgrade
- Applications in development, regression testing, and conformance testing
- Detailed logging of forward and reverse link signaling messaging packets at each layer, and RLP frames and TAS frames
- C.S0038-0 Signaling Conformance Specification testing
- Handoff and power control testing
- Pilot pollution simulation
- Script driven network emulation
- Easy to use Windows™ user interface
- Campaign manager to enable a series of tests to be run automatically

PRODUCT DESCRIPTION

The EV-DO option for the Aeroflex CDMA-AIME protocol test system enables it to test CDMA2000 EV-DO access terminals. The system is designed for use in research and development environments or for use in laboratory conformance and inter-operability testing. The system acts as a network emulator, and it provides built in logging of all signaling procedures to enable full testing and investigation. In this way the message logging system provides a cost effective environment to perform testing.

OVERVIEW

The EV-DO upgrade provides full access to the forward link messaging via the scripting language used. The protocol stack messaging operates automatically but can be modified by the user if required. All signaling messages are time stamped and logged for subsequent review.

The system enables many aspects of the performance of the mobile to be tested. These include signaling messages, data protocol performance, mobile power control, pilot pollution, authentication and encryption, and handoff including EV-DO.

One of the main applications of the EV-DO system is to perform C.S0038-0 Conformance tests. A suite of test cases can be provided to enable this testing to be accomplished efficiently.

INTERFACING

To enable the system to be used to its greatest potential, it incorporates a Windows user interface that runs on a PC. There is an activity window to display status messages along with a signaling message window. A campaign manager is included to allow a series of test cases to be run sequentially.

SYSTEM CONFIGURATION

The EV-DO option runs on the Aeroflex 6204 or 6402 platforms to create the EV-DO AIME system. Each EV-DO carrier can emulate three Access Networks and an additional PC controls the system.

The system is connected to the Access Terminal via the normal RF antenna port using a coaxial cable.

PROTOCOL TESTING

The signaling messages are fully under the control of the user. A script language is used to generate test scripts that control Forward Signaling messages during each test run. Example scripts are pro-

vided and can be modified by the user and built up into a library of Test Scripts for continued use subject to the terms of the license.

SIGNALING CONTROL

The script language allows the user to generate all signaling messages and gives control of each parameter in the message. A library of messages specified by C.S0024-0 is provided. Messages may also be modified and new messages can be added.

The script language enables the user to set up test scenarios comprising a series of signaling messages, and then investigates the performance of the Access Terminal under test.

PROTOCOL CONTROL

A protocol stack is implemented in the EV-DO system and operates automatically. However if required, its operation can be modified to allow the user to test the protocol entity with the access terminal.

LOGGING

All Forward and Reverse link signaling messages, RLP frames, TAS frames, and packets on each layer are time-stamped and logged on the PC for subsequent review.

HANDOFF AND POWER CONTROL TESTING

The EV-DO System can be used to investigate the behavior of an Access Terminal under both soft and hard handoff conditions.

The System can be used to investigate the behavior of power control algorithms in an Access Terminal under a variety of conditions including soft handoff scenarios.

The user has full control of the reverse power control bit in the Forward MAC channel and also has fine control of the System output power.

FORWARD AND REVERSE LINK CHANNEL SUPPORT

Each EV-DO carrier allows a user to transmit three forward channels plus noise that can be combined in various ways. It allows the reception of one reverse channel for each carrier.

CONTROL CHANNEL

A distinct Control Channel can be transmitted on each of the Forward Channels

FORWARD TRAFFIC CHANNEL

In each carrier there can be only one forward Traffic Channel. However this channel can be routed to any of the three Forward Channels based on the DRC cover; this can be used to emulate soft hand-off scenarios. The Forward Channels are on the same programmable frequency, but the user can program other properties of these channels independently. These properties include:

- PN offset
- Total channel output power
- Propagation delay
- DRC Cover

In addition to these forward channels each carrier can also transmit noise.

MAC CHANNELS

A distinct set of the following MAC Channels can be transmitted on each of the Forward Channels:

- Reverse Activity
- DRC Lock
- Reverse Power Control

REVERSE TRAFFIC CHANNEL

Each carrier supports the reception of one Reverse Channel

HANDOFF CAPABILITY

A single carrier can support 2-way and 3-way soft handoff. An EV-DO-AIME with two EV-DO carriers can support hard handoff between the carriers. EV-DO-AIME with one EV-DO carrier and one 1X-AIME carrier can support intersystem hard handoff between the two carriers.

SYSTEM CONTROL

Like the 1X-AIME system the EV-DO option uses a COM compatible software interface, therefore the user can use the script interpreter built into the User Interface.

SCRIPT LANGUAGE

The EV-DO option uses an ActiveX scripting engine that allows the SAX BASIC Script to be used to control the system. This is also compatible with the 1X-AIME system.

ALTERNATIVE SYSTEM CONTROL

All the example scripts supplied with the system and the optional conformance scripts are written in SAX BASIC Script language.

PROCEDURES AND TEST CASES SUPPLIED

The standard EV-DO option is supplied complete with a number of example scripts based on C.S0024. These can be used directly or the user can incorporate them into other scripts. Example of these proceedures are:

- Mobile Originated Packet Data Call Setup
- Soft handoff
- Hard handoff
- Hybrid handoff
- Session Setup
- AAA Access Stream Authentication
- Packet Data Call In Fading Environment
- TAS protocols test
- Keep Alive Request test
- RRI Logging test
- Propagation Delay
- Pilot Pollution

A facility is also provided to run a sequence of test cases as a test campaign. The user can vary the length and the content of the test campaign to suit the individual needs.

PROTOCOL TESTING

Signaling messages are completely controlled by the script. These can be the example scripts provided with the System, the User's own scripts or the optional Conformance Test Cases available with the System.

While the script is running, the system logs all signaling messages, on both Forward and Reverse links on the PC for future review

The user, via the script, has full control of the protocols, procedures and timings used. The user can send and receive any signaling messages and parameters in those messages, including incorrect or erroneous messages. The user can also construct new messages not yet in the C.S0024 message catalog.

All logged messages are also time stamped with the time they are sent or received by the EV-DO System.

The user can make the signaling procedures as simple or as complex as require for the type of testing to be performed.

All the forward and reverse message fields and their contents in each message can be reviewed including the common identification fields where relevant. The messages can also be filtered to reduce the amount of information displayed. A "find" feature is included.

The EV-DO system contains a full implementation of the C.S0024 protocol stack. This normally runs automatically and the user does not need to specify the protocol entities action in the script.

Certain protocol entities behavior can be modified under script control, to allow the user to investigate and test the stack performance and behavior of the Access Terminal under test.

PILOT POLLUTION TESTING

The fine control of the carrier, means the EV-DO system is ideal for simulating pilot pollution scenarios for R&D testing of Access Terminals.

Each EV-DO carrier in the system can be set up to provide 3 independent forward channels. The user can rapidly vary the relative pilot levels in a completely controlled and repeatable manner.

HANDOFF TESTING

The EV-DO system is ideal for setting up and investigating different handoff scenarios. All types of soft and hard handoffs can be simulated.

Within the EV-DO system each carrier can be configured to simulate up to three Access Networks (on the same frequency) for performing two-way or three-way soft handoff. For hard handoff the second carrier is also used. For hybrid handoff (EV-DO to 1X) the second carrier can be used and will act as a 1X Base Station.

PN offsets, Frame offsets, frequency and relative power output levels as well as a differential delay between Access Networks (to simulate Access Networks at different distances from the Access Terminal) are all fully programmable.

LOGGING FACILITIES

SIGNALING MESSAGE LOGGING

All forward and reverse link signaling messages are detected by the test system and passed to the Controller PC for time stamping and logging. These messages are decoded and made available for display at the GUI.

RADIO LINK PROTOCOL LOGGING

RLP signaling messages are logged with other signaling messages. RLP packets can be logged under user control from a test script. Forward and reverse packets are logged separately.

DATA RATE CONTROL LOGGING

Data Rate Control (DRC) values requested by the AT can be logged on a slot by slot basis when necessary under the control of the user. DRC values vs time are displayed as graphs for each sector. The graphs for each sector are displayed with different colors.

PACKET LOGGING

Reverse packets received on each layer can be logged. These logs can be decoded and made available for display.

USER INTERFACE

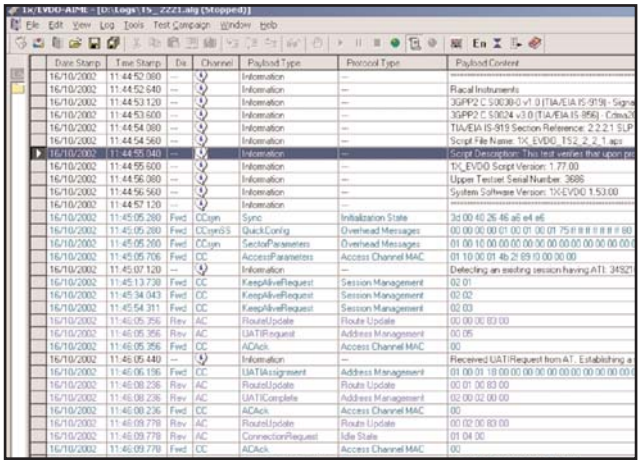
The Windows User Interface that runs on the PC allows the user to control all aspects of the testing. It also provides extra features for use in the post processing of results.

ACTIVITY WINDOW

An Activity window displays various status messages to the user during the running of a Test Script. It can also be used to prompt the user as necessary during testing for example "Please place a call from the Mobile now".

SIGNALING WINDOW

This displays the signaling messages, either in real time during a test run, or for subsequent review from a saved file. When displaying messages in real time during a test run the window can be 'paused' so that an area of interest can be viewed without waiting for the test run to complete.



LICENSE OPTIONS

The EV-DO Rel 0 protocol support is obtained through the following options:

- 6204/6402-101 EV-DO Release 0 System Software
- 6204/6402-210 EV-DO C.S0038-0 Signaling Conformance Test Cases

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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused.

Part No. 46891/201, Issue 3, 04/08