Cisco **AVVID Solution**

IP Telephony

Interoperability of

Cisco CallManager 3.0 (Cisco 3640 Router)
with Fujitsu F9600ES PBX Using T1-CAS

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Summary

This document contains the results of Fujitsu (F9600ES, Rel. 13) PBX interoperability testing with T1-CAS signaling on the Cisco 3640 connected to Cisco CallManager 3.0 (1) using an Ethernet link.

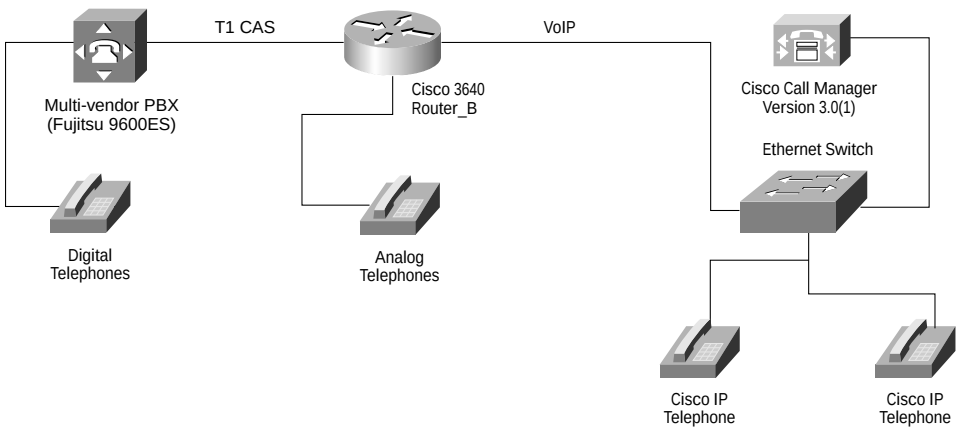
The following points should be noted:

- The Fujitsu PBX was set to provide clocking so the Cisco 3640 needs to be set to derive its clock from the incoming DS1 line “line clock”.

Test Configuration

Figure 1 is representative of the various configurations used for testing.

Figure 1 Basic Call Setup Configuration



Test Results

This section presents test cases and results that were used to evaluate the 2MFT T1-CAS on the Cisco 3640.

Voice Call Signaling, Call Completion, Voice Path Confirmation

PBX Signaling Interoperability: E&M Immediate-Start

The objective of this test case is to test the Cisco 3640 Digital T1 interfaces using T1-CAS signaling options on the Fujitsu F9600ES PBX and to test basic call setup functionality between the Cisco CallManager 3.0 (1) and Cisco 3640, and the Fujitsu 9600ES PBX using E&M Immediate-Start, robbed-bit signaling type.

As you begin the test procedure, refer to Figure 1 for the topology used for this test case. Set up the Cisco 3640 Port configuration as shown in Table 1 below. Place a call from the digital phone connected to the PBX on router_B to the IP phone connected to the Ethernet switch and record the results. Verify that the call goes through and that a full-duplex speech path exists between the phones. Repeat this procedure for a call in the other direction (from IP phone to PBX on router_B). Print out a sample of the PBX, Cisco 3640, and Cisco CallManager configurations.

Table 1 PBX Signaling Interoperability: E&M Immediate-Start shows the test results

FUJITSU setting	Cisco 3640 setting	pass/fail	RESULTS
(Tie Trunk, E&M Immediate)	`ds0-group 1 timeslots 1-24 type e&m-immediate-start`	**Pass**	No problems dialing through the PBX using this signaling type.

Signaling Interoperability: E&M Wink-Start

The test objective is to test the Cisco 3640 Digital T1 interfaces over the T1-CAS signaling options on the Fujitsu F9600ES PBX and to test basic call setup functionality between the Cisco CallManager 3.0 (1)/3640 and the Fujitsu F9600ES PBX using E&M Wink-Start, robbed-bit signaling type.

To begin the test procedure, refer to Figure 1 for the topology used for this test case. Set up the Cisco 3640 port configuration as listed in Table 2. Place a call from the digital phone connected to the PBX on router_B to the IP phone connected to the Ethernet switch and record results. Verify that the call goes through that a full-duplex speech path exists between the phones. Repeat this procedure for a call in the other direction (from IP phone to PBX on router_B).

Table 2 - PBX Signaling Interoperability: E&M Wink-Start shows the test results.

Table 2 PBX Signaling Interoperability: E&M Wink-Start

FUJITSU setting	Cisco 3640 setting	pass/fail	RESULTS
(Tie Trunk, E&M Wink)	`ds0-group 1 timeslots 1-24 type e&m-wink-start`	**Pass**	No problems dialing through the PBX using this signaling type.

PBX Signaling Interoperability: E&M Delay-Dial

The test objective is to test the Cisco 3640 Digital T1 interfaces over the T1-CAS signaling options on the Fujitsu F9600ES PBX and to test basic call setup functionality between the Cisco CallManager 3.0 (1)/3640 and the Fujitsu F9600ES PBX using the E&M Delay-Dial, robbed-bit signaling type.

To begin the test procedure, refer to Figure 1 for the topology used for this test case. Set up the Cisco 3640 port configuration as listed in Table 3. Place a call from the digital phone connected to the PBX on router_B to the IP phone connected to the Ethernet switch and record the results. Verify that the call goes through and a full-duplex speech path exists between the phones. Repeat this procedure for a call in the other direction (from IP phone to PBX on router_B).

The test results are shown in Table 3 - PBX Signaling Interoperability: E&M Delay-Dial.

Table 3 PBX Signaling Interoperability: E&M Delay-Dial

FUJITSU setting	Cisco 3640 setting	pass/fail	RESULTS
(Tie Trunk, E&M Delay-Dial)	`ds0-group 1 timeslots 1-24 type e&m-delay-dial`	**Pass**	No problems dialing through the PBX using this signaling type.

Equipment Configuration

Cisco Call Manager Configuration

Cisco CallManager was configured for Software Release 3.0 (1) as shown in the following figures.

Figure 2 Cisco CallManager Configuration

Figure 3 Cisco CallManager Route Pattern Configuration

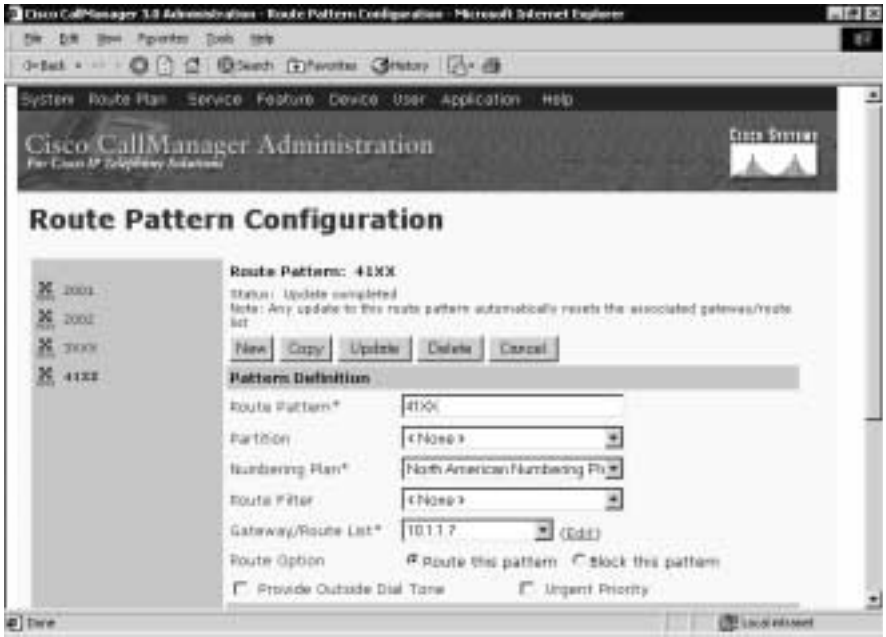
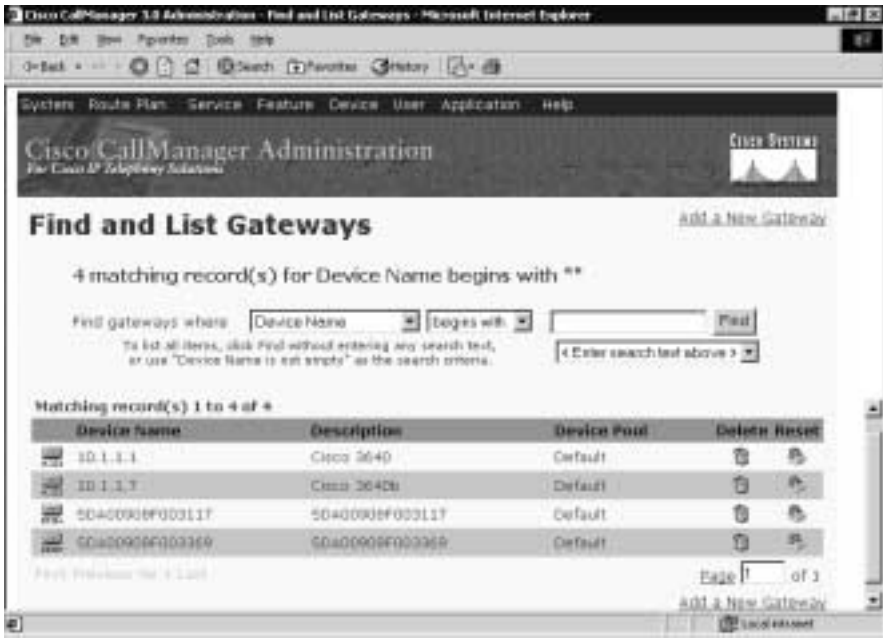


Figure 4 Cisco CallManager Gateway Configuration



Cisco 3640 Configuration

The listing below provides the configuration of the 3640 router.

Router “B” contains the following hardware:

- 2E2W carrier in slot 0
- NM-HDV carrier in slot 1
- VWIC-2MFT T1 in carrier slot 0
- VOICE 2V carrier in slot 2
- VIC 2FXS in carrier slot 0
- VIC 2FXO in carrier slot 1

```
EUT_B#sh vers
Cisco Internetwork Operating System Software
IOS (tm) 3600 Software (C3640-JS-M), Experimental Version 12.1(20000530:031732)
[liha-v121_2_xd_throttle.LATEST 104]
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled Tue 30-May-00 08:18 by liha
Image text-base: 0x600088F0, data-base: 0x61444000
ROM: System Bootstrap, Version 11.1(7)AX [kuong (7)AX], EARLY DEPLOYMENT RELEASE
 SOFTWARE (fc2)
EUT_B uptime is 26 minutes
System returned to ROM by power-on
System image file is "flash:c3640-js-mz"
cisco 3640 (R4700) processor (revision 0x00) with 60416K/5120K bytes of memory.
Processor board ID 05247801
R4700 CPU at 100Mhz, Implementation 33, Rev 1.0
Bridging software.
X.25 software, Version 3.0.0.
SuperLAT software (copyright 1990 by Meridian Technology Corp).
TN3270 Emulation software.
Primary Rate ISDN software, Version 1.1.
2 Ethernet/IEEE 802.3 interface(s)
2 Channelized T1/PRI port(s)
2 Voice FXO interface(s)
2 Voice FXS interface(s)
DRAM configuration is 64 bits wide with parity disabled.
125K bytes of non-volatile configuration memory.
16384K bytes of processor board System flash (Read/Write)
Configuration register is 0x0
EUT_B#
```

```
EUT_B#sh diag
Slot 0:
        Combo 2E, 2W Port adapter, 4 ports
        Port adapter is analyzed
        Port adapter insertion time unknown
        EEPROM contents at hardware discovery:
        Hardware revision 1.2           Board revision B0
        Serial number     7687847       Part number    800-01171-04
        Test history      0x0           RMA number     00-00-00
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 1E 01 02 00 75 4E A7 50 04 93 04 00 00 00 00
          0x30: 58 00 00 00 98 02 28 17 FF FF FF FF FF FF FF FF
Slot 1:
        High Density Voice Port adapter
        Port adapter is analyzed
        Port adapter insertion time unknown
        EEPROM contents at hardware discovery:
        Hardware Revision        : 1.0
        Part Number              : 800-03567-01
        Board Revision           : B0
        Deviation Number         : 0-0
        Fab Version              : 02
PCB Serial Number        : JAB034906LE
        RMA Test History         : 00
        RMA Number               : 0-0-0-0
        RMA History              : 00
        EEPROM format version 4
        EEPROM contents (hex):
          0x00: 04 FF 40 00 CC 41 01 00 C0 46 03 20 00 0D EF 01
          0x10: 42 42 30 80 00 00 00 00 02 02 C1 8B 4A 41 42 30
          0x20: 33 34 39 30 36 4C 45 03 00 81 00 00 00 00 04 00
          0x30: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
          0x40: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
          0x50: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
          0x60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
          0x70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
        WIC Slot 0:
        T1 (2 Port) Multi-Flex Trunk (Drop&Insert) WAN Daughter Card
        Hardware revision 1.0           Board revision A0
        Serial number     19621702      Part number    800-04614-02
        Test history      0x0           RMA number     00-00-00
        Connector type    PCI
        EEPROM format version 1
        EEPROM contents (hex):
0x20: 01 24 01 00 01 2B 67 46 50 12 06 02 00 00 00 00
          0x30: 50 00 00 00 00 05 20 00 FF FF FF FF FF FF FF FF
        HDV firmware: Compiled Fri 05-May-00 10:55 by richc
        HDV memory size 524280 heap free 211705
Slot 2:
        4 PORT Voice PM for MARs Port adapter
        Port adapter is analyzed
        Port adapter insertion time unknown
        EEPROM contents at hardware discovery:
        Hardware revision 1.0           Board revision B0
        Serial number     7968567       Part number    800-02491-01
        Test history      0x0           RMA number     00-00-00
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 65 01 00 00 79 97 37 50 09 BB 01 00 00 00 00
```

```
          0x30: 58 00 00 00 98 04 01 17 FF FF FF FF FF FF FF FF
        WIC Slot 0:
        FXS Voice daughter card (2 port)
        Hardware revision 1.0           Board revision B0
        Serial number     7088068       Part number    800-02493-01
Test history      0x0           RMA number     00-00-00
        Connector type    Wan Module
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 0E 01 00 00 6C 27 C4 50 09 BD 01 00 00 00 00
          0x30: 58 00 00 00 98 01 28 01 FF FF FF FF FF FF FF FF
        WIC Slot 1:
        FXO Voice daughter card (2 port)
        Hardware revision 1.0           Board revision B0
        Serial number     7857070       Part number    800-02495-01
        Test history      0x0           RMA number     00-00-00
        Connector type    Wan Module
        EEPROM format version 1
        EEPROM contents (hex):
          0x20: 01 0D 01 00 00 77 E3 AE 50 09 BF 01 00 00 00 00
          0x30: 58 00 00 00 98 03 26 01 FF FF FF FF FF FF FF FF
EUT_B#
```

```
EUT_B#sh controllers t1
T1 1/0 is down.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  Transmitter is sending remote alarm.
  Receiver has loss of signal.
  alarm-trigger is not set
  Version info Firmware: 20000308, FPGA: 8
  Framing is SF, Line Code is AMI, Clock Source is Line.
  Data in current interval (49 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 49 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 49 Unavail Secs
  Total Data (last 2 15 minute intervals):
     0 Line Code Violations, 0 Path Code Violations,
     0 Slip Secs, 1800 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 1800 Unavail Secs
T1 1/1 is up.
  Applique type is Channelized T1
  Cablelength is short 133
  No alarms detected.
  alarm-trigger is not set
  Version info Firmware: 20000308, FPGA: 8
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  Data in current interval (94 seconds elapsed):
     0 Line Code Violations, 0 Path Code Violations
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
  Total Data (last 2 15 minute intervals):
     0 Line Code Violations, 0 Path Code Violations,
     0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
     0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
EUT_B#
```

```
EUT_B#sh conf
Using 1256 out of 129016 bytes
!
version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
no service dhcp
!
hostname EUT_B
!
!
!
!
!
!
voice-card 1
!
ip subnet-zero
no ip domain-lookup
ip host whiz 171.69.1.162
ip host dirt 171.69.1.129
ip host danube 171.69.17.14
!
no lane client flush
isdn switch-type primary-qsig
isdn voice-call-failure 0
cns event-service server
!
!
!
!
!
!
controller T1 1/0
!
controller T1 1/1
 framing esf
 linecode b8zs
 cablelength short 133
 ds0-group 1 timeslots 1-24 type e&m-immediate-start
!
!
!
interface Tunnel1
 no ip address
!
interface Ethernet0/0
 ip address 10.1.1.7 255.255.255.0
 no ip mroute-cache
 no cdp enable
!
interface Ethernet0/1
 ip address 192.168.71.6 255.255.255.0
 no ip mroute-cache
 no cdp enable
!
ip classless
no ip http server
!
```

```
no cdp run
!
!
voice-port 1/1:1
!
voice-port 2/0/0
!
voice-port 2/0/1
!
voice-port 2/1/0
!
voice-port 2/1/1
!
dial-peer voice 1 pots
 destination-pattern 5000
 port 2/0/0
!
dial-peer voice 5 pots
 destination-pattern 4...
 port 1/1:1
 prefix 4
!
dial-peer voice 7 voip
 destination-pattern 4003
 session target ipv4:10.1.1.2
 dtmf-relay h245-alphanumeric
 codec g711ulaw
!
!
line con 0
 transport input none
line aux 0
line vty 0 4
 no login
!
end
EUT_B#
```

Fujitsu F9600ES (Rel 13) Configuration

Figure 5 - Fujitsu F9600ES Software Configuration shows the software configuration for the Fujitsu F9600ES.

Figure 5 Fujitsu F9600ES Software Configuration

Figure 6 - Fujitsu Main Clock Status Display through Figure 12 - Fujitsu MLDT Assignment List shows the configuration of various signaling types for the Fujitsu F9600ES.

Figure 6 Fujitsu Main Clock Status Display

Figure 7 Fujitsu Trunk Group Data List

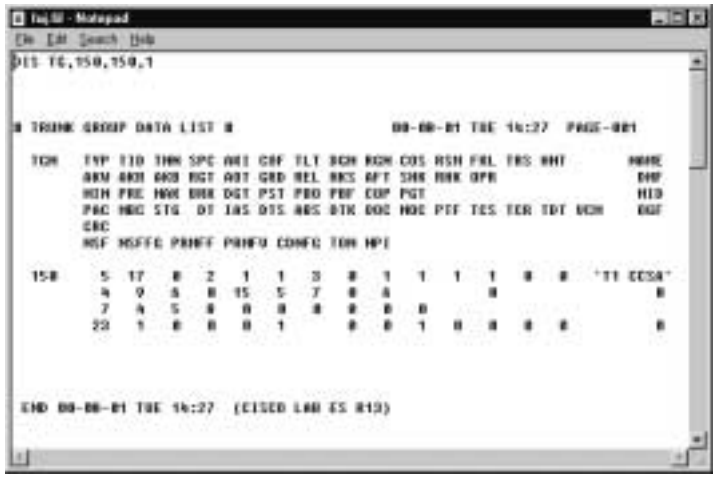


Figure 8 Fujitsu Trunk Interface Using Immediate-Start Signaling Type

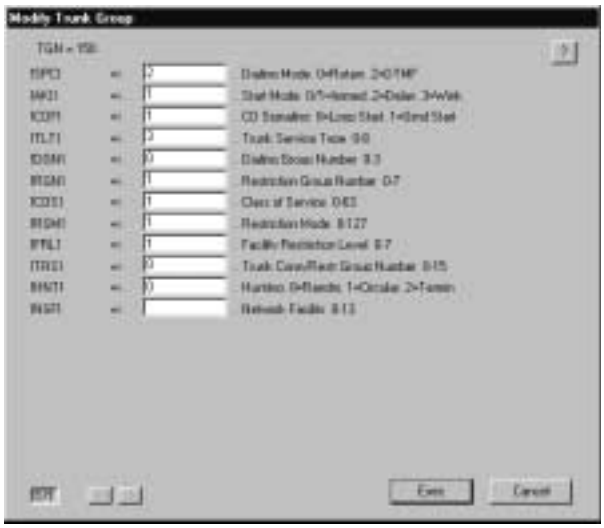


Figure 9 Changing Fujitsu Trunk Signaling Type from Immediate-Start to Delay-Dial

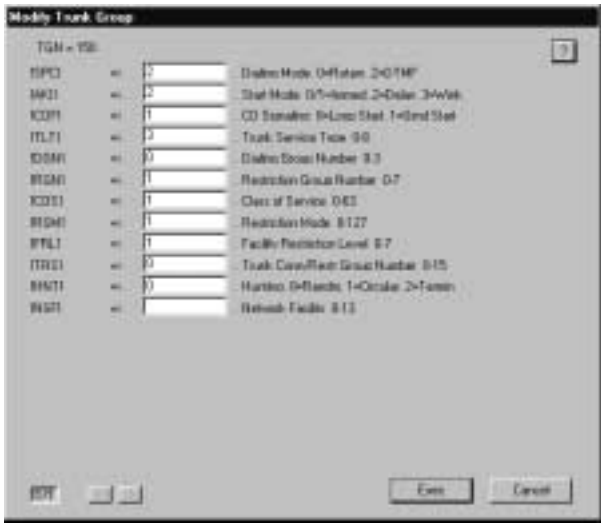


Figure 10 Changing Fujitsu Trunk Signaling Type from Delay-Dial to Wink-Start

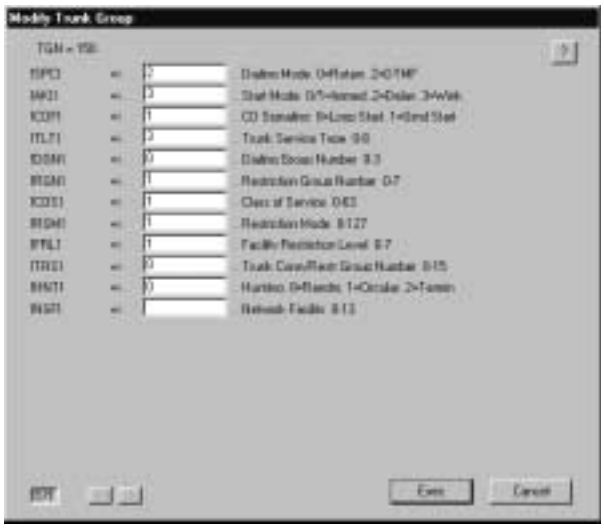


Figure 11 Fujitsu Numbering Plan List

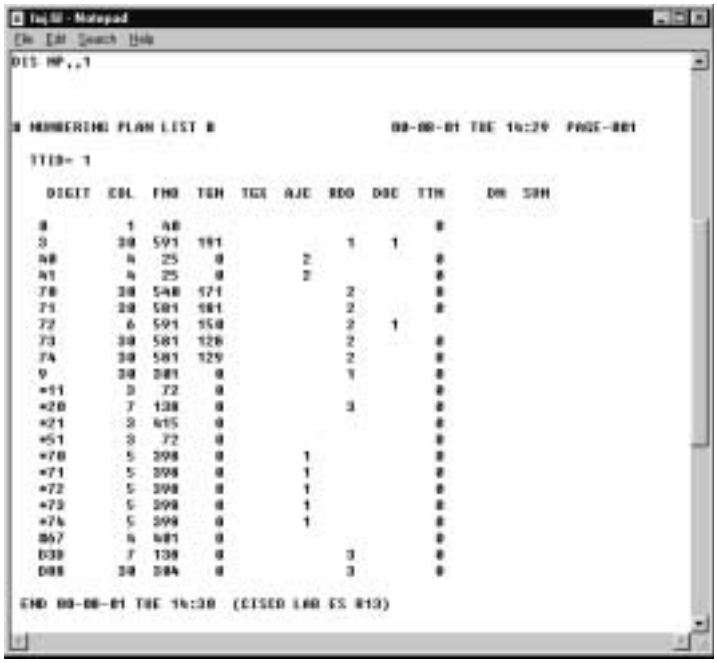
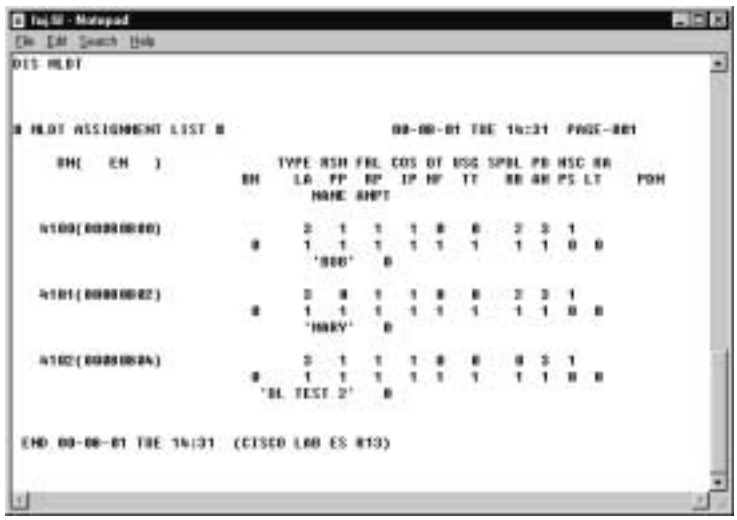


Figure 12 Fujitsu MLDT Assignment List



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