Application Note

Ericsson MD110 BC12 using DPNSS to Westell IiQ2000 using QSIG to Cisco Unified Unified CallManager 4.1.3

October 26, 2007 Revision 3

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Introduction

This application note provides configuration guidelines for connecting a DPNSS trunk from an Ericsson MD-110 Release BC12 PBX to Cisco Unified CallManager Release 4.1 via Cisco IOS voice gateways using ISO QSIG protocol. A Westell Interchange iQ2000 was used for interworking DPNSS and QSIG.

The Ericsson MD110 PBX was connected via an E1 DPNSS trunk circuit to a DPNSS port on a Westell IiQ2000 protocol converter box. The QSIG port on the Westell IiQ2000 was connected to a QSIG port on a Cisco IOS voice gateway. The voice gateway was connected to Cisco Call Manager via IP over Ethernet, and configured for VoIP using MGCP. Cisco 7960 IP phones were also connected in similar manner to the Cisco Call Manager, and controlled via Cisco "skinny" protocol. End-to-end calls were placed between the PBX digital stations and the 7960 IP phones to exercise and test basic calls as well as DPNSS supplementary services such as caller ID, call transfer, call conference, and call back. The network topology diagram (Figure 1) shows the test setup for end-to-end interoperability with the Cisco Unified CallManager connected to the PBX as described.

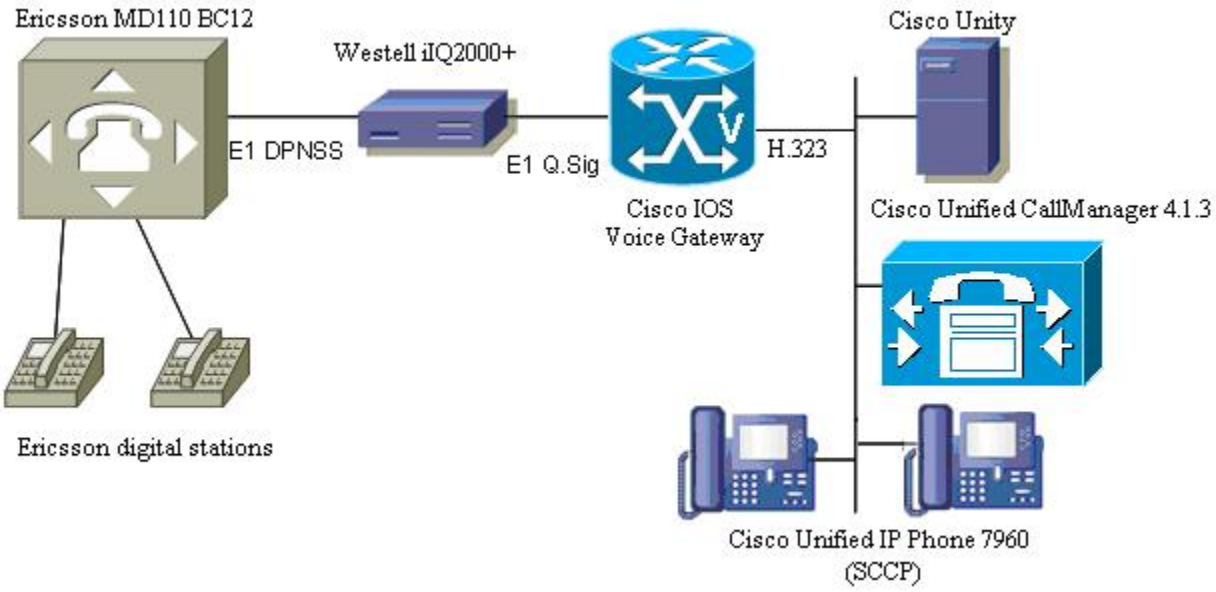
Connectivity is achieved by using the E1 PRI QSIG protocol type on the Cisco IOS voice gateway with Cisco Unified CallManager Service parameter QSIG variant of ISO and ISO switch type on the Westell IiQ2000. The IiQ2000 provides a protocol "conversion" from ISO QSIG on the Cisco Unified CallManager to DPNSS, which is supported natively on the Ericsson MD110 PBX.

This Application Note uses the Cisco 3845 voice gateway. However it also applies to other Cisco voice gateways, since Unified CallManager QSIG implementation does not depend on the physical platform.

Using the Ericsson PBX configuration, Westell IiQ2000 configuration, and Cisco IOS voice gateway configuration in this application note, successful toll bypass integration was achieved. This includes basic call, caller ID (calling and connected number only), call transfer, call conference, and call back, with some limitations on Call Diversion and Caller ID features during these scenarios.

Network Topology

Figure 1. Network Topology or Test Setup



System Components

Hardware Requirements

Cisco 3845 with NM-HDV and VWIC-2MFT-E1

Cisco MCS 7800

(2) Cisco 7960 IP phones

Ericsson MD110 including TLU76/1 E1 interface card

(2) Ericsson MD110 digital stations

Westell IiQ2000

Software Requirements

Cisco Unified CallManager Release 4.1.3.

Ericsson MD110: Release BC12 SP5

Cisco IOS Release 12.3

Westell IiQ2000 software: Vision iQ Ver. 3.2.2.

Features

Features Supported

Basic Call

Caller ID: Calling and Connected Number

Blind Local Transfer

Blind Network / External Transfer

Supervised Local Transfer

Supervised Network / External Transfer

Call Conference

Call Back When Free

Call Back When Next Used

Route Optimization (with Supervised Network/External Transfers)

MWI (See Limitations Section)

Features Not Supported

The Ericsson MD110 does not support Calling/Called/Connected Name presentation using DPNSS.

Limitations

No testing with the Operator Console was performed because there was not an operator console at the time of test.

The MD110 does not support (Calling/Called/Connected) Name presentation with DPNSS.

The MD110 supports Connected Number, not Called Number, with DPNSS.

On Supervised Transfers, the Calling Number was updated on the final destination phone upon the transfer completion, which happened after the destination answered in a supervised transfer.

On Blind Transfers, the Calling Number was updated on the final destination phone upon the transfer completion, which happened before the destination answered in a blind transfer.

For Blind Network/External Transfers originating on an IP phone, transferred by an Ericsson MD110 phone, with the final destination as another IP phone (i.e., Phone C calls Phone A, and Phone A transfers to Phone D) DPNSS Call Diversion did not work correctly. The call transfer completed, but resulted in a hairpin call (both trunk circuits were still up). This is normal operation for Cisco Unified CallManager. If the converse call is made (i.e., Phone A calls Phone C, and Phone C transfers to Phone B), DPNSS Call Diversion worked correctly, following transfer completion, to remove PBX – Cisco Unified CallManager trunks. The difference is because ISO QSIG states that the call trunk shall not perform Path Replacement ("Route Optimization" in DPNSS parlance), until there is a connected path in both directions. In a blind transfer, the second leg is not connected when the transfer is completed. The PBX is DPNSS, and the Cisco Unified CallManager is QSIG.

MWI:

With BC12 where the Voicemail system is directly integrated to the MD110, although an MWI message is generated by the PBX, the format is incorrect, and consequently it will be dropped by the Westell. This is due to the MWI NSI string containing illegal characters according to the DPNSS specification BTNR 188. This fault has been demonstrated not to occur on customer sites running BC9 and BC10.

MWI generated from a Unified CallManager attached voicemail platform such as Cisco Unity is able to signal MWI to MD110 phones via the NSI string on all tested versions of Ericsson software (BC9, BC10 and BC12).

Further, where the MWI is generated by a voicemail system itself attached using DPNSS to the MD110, the NSI string relevant to MWI is that generated by the voicemail platform itself and not the MD110. In those instances, the version of MD110 software has no impact on the MWI NSI string. From customer experience, there are instances of external voicemail bureaus connected over DPNSS trunks to an MD110 running BC12 which is able to generate an MWI message to a CCM-attached phone.

Configuration

Configuring the Ericsson MD 110 PBX

<rocap:rou=11;

ROUTE CATEGORY DATA

ROU SEL TRM SERV NODG DIST DISL TRAF SIG BCAP

11 7110000000000010 5 3110000000 0 20 10 03151515 111110000011 111111

END

<rodap:rou=11;

ROUTE DATA

ROU TYPE VARC VARI VARO FILTER

11 TL50 H'00000001 H'00000000 H'00000000 NO

END

<roddp:dest=40;

EXTERNAL DESTINATION ROUTE DATA

DEST DRN ROU CHO CUST ADC TRC SRT NUMACK PRE

40 11 05050000000002500050011000 0 1 0

END

<roedp:rou=11,tru=all;

ROUTE EQUIPMENT DATA

ROU	TRU	EQU	IP ADDRESS	SQU	INDDAT	CNTRL
11	001-1	001-0-40-01			H'0000000000FF	
11	001-2	001-0-40-02			H'0000000000FF	
11	001-3	001-0-40-03			H'0000000000FF	
11	001-4	001-0-40-04			H'0000000000FF	
11	001-5	001-0-40-05			H'0000000000FF	
11	001-6	001-0-40-06			H'0000000000FF	
11	001-7	001-0-40-07			H'0000000000FF	
11	001-8	001-0-40-08			H'0000000000FF	
11	001-9	001-0-40-09			H'0000000000FF	
11	001-10	001-0-40-10			H'0000000000FF	
11	001-11	001-0-40-11			H'0000000000FF	
11	001-12	001-0-40-12			H'0000000000FF	
11	001-13	001-0-40-13			H'0000000000FF	
11	001-14	001-0-40-14			H'0000000000FF	
11	001-15	001-0-40-15			H'0000000000FF	
11	001-17	001-0-40-17			H'0000000000FF	
11	001-18	001-0-40-18			H'0000000000FF	

11	001-19	001-0-40-19	H'0000000000FF
11	001-20	001-0-40-20	H'0000000000FF
11	001-21	001-0-40-21	H'0000000000FF
11	001-22	001-0-40-22	H'0000000000FF
11	001-23	001-0-40-23	H'0000000000FF
11	001-24	001-0-40-24	H'0000000000FF
11	001-25	001-0-40-25	H'0000000000FF
11	001-26	001-0-40-26	H'0000000000FF
11	001-27	001-0-40-27	H'0000000000FF
11	001-28	001-0-40-28	H'0000000000FF
11	001-29	001-0-40-29	H'0000000000FF
11	001-30	001-0-40-30	H'0000000000FF
11	001-31	001-0-40-31	H'0000000000FF

END

<

<cadap;

CALENDAR DATA

IDENTITY=DANDS-EURO

VERSION=CXP1010101/2/BC12SP5/R2A

15:07:52

THU 13 OCT 2005

END

<aspap:parnum=223;

APPLICATION SYSTEM PARAMETERS

PARNUM PARVAL

223 7

END

<aspap:parnum=66;

APPLICATION SYSTEM PARAMETERS

PARNUM PARVAL

66 1

END

Figure 2. ISO Protocol Service Parameter

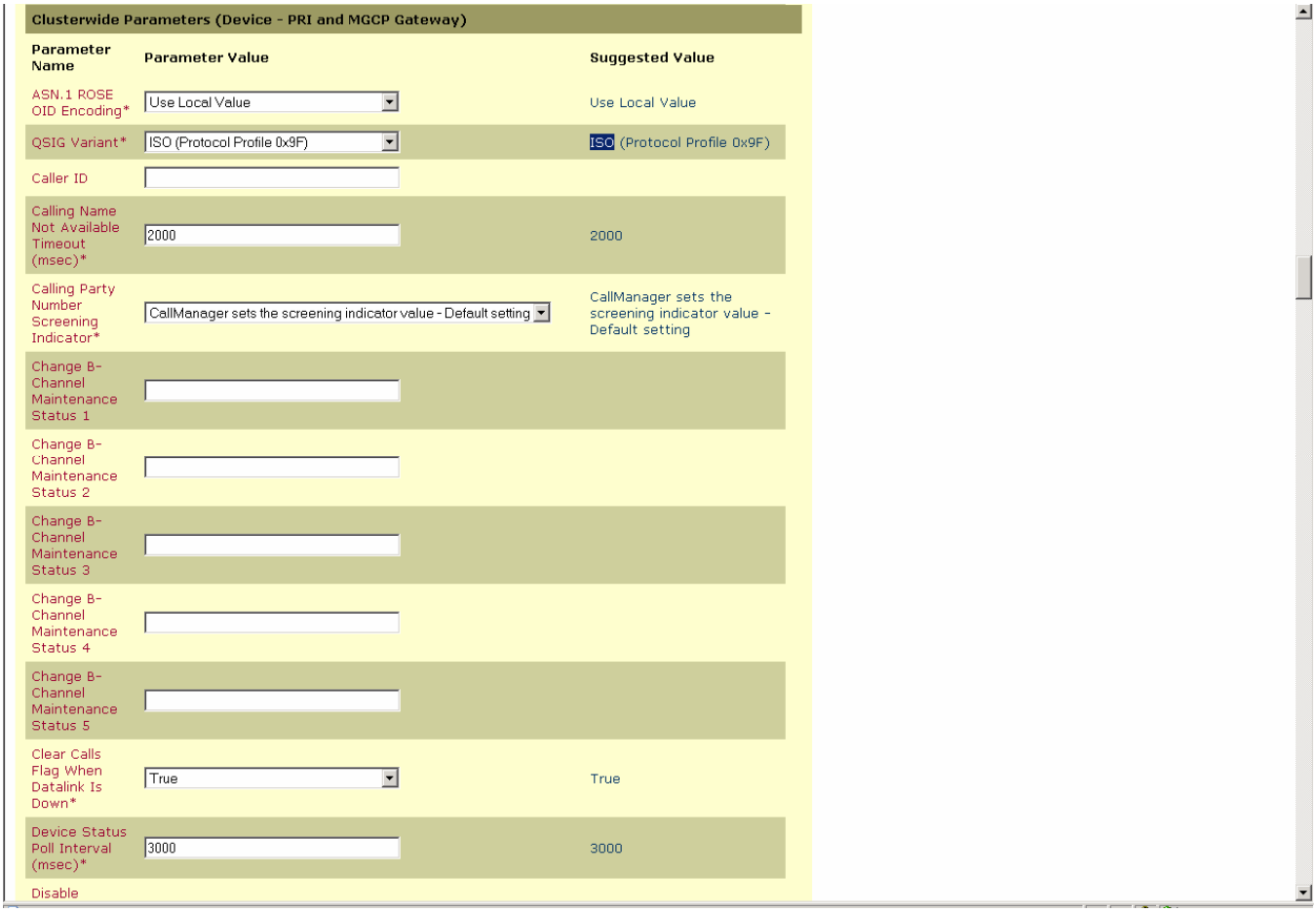


Figure 3. CMM-E1 Gateway Configuration

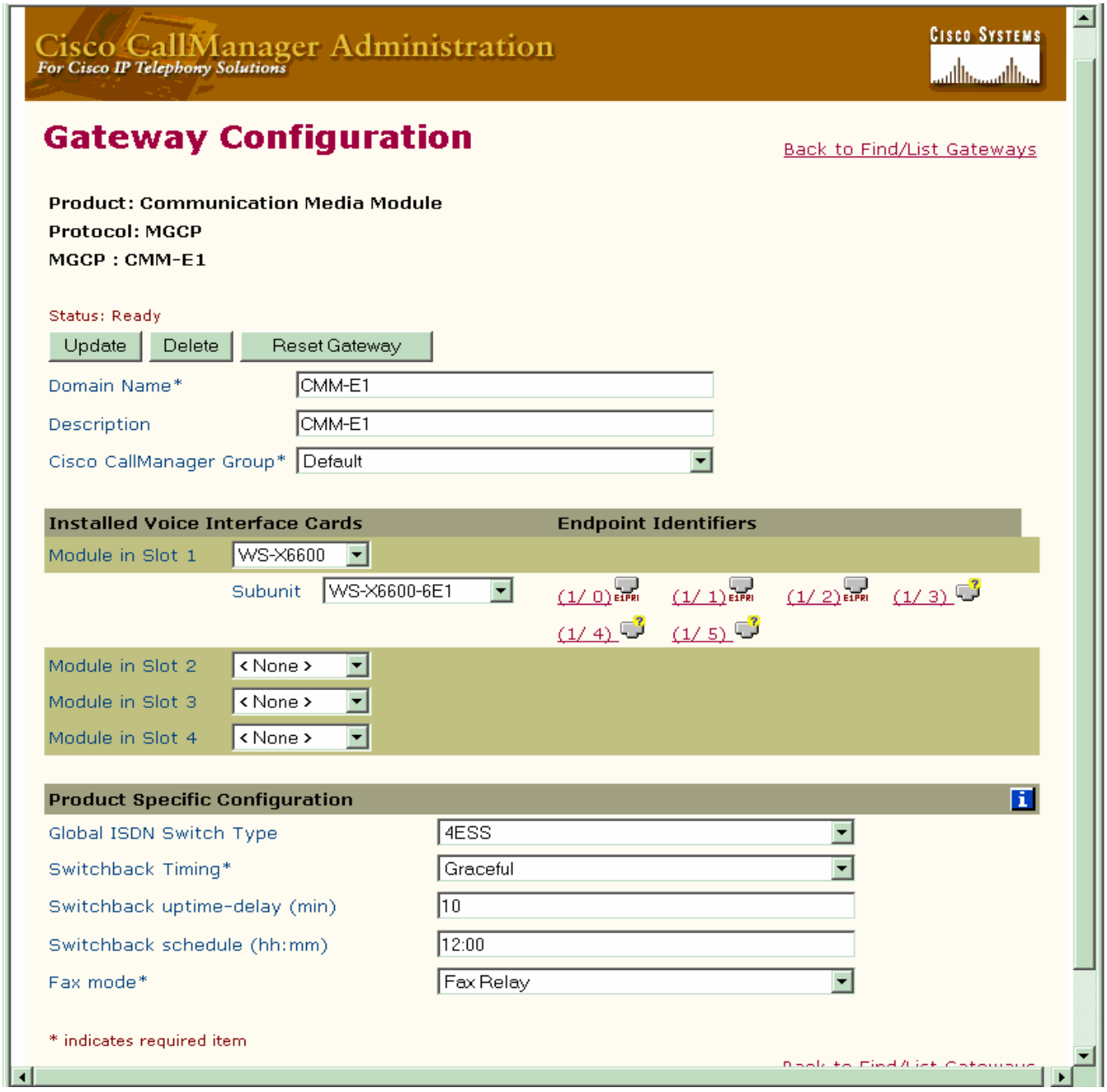


Figure 4. CMM-E1 Gateway Configuration (continued)

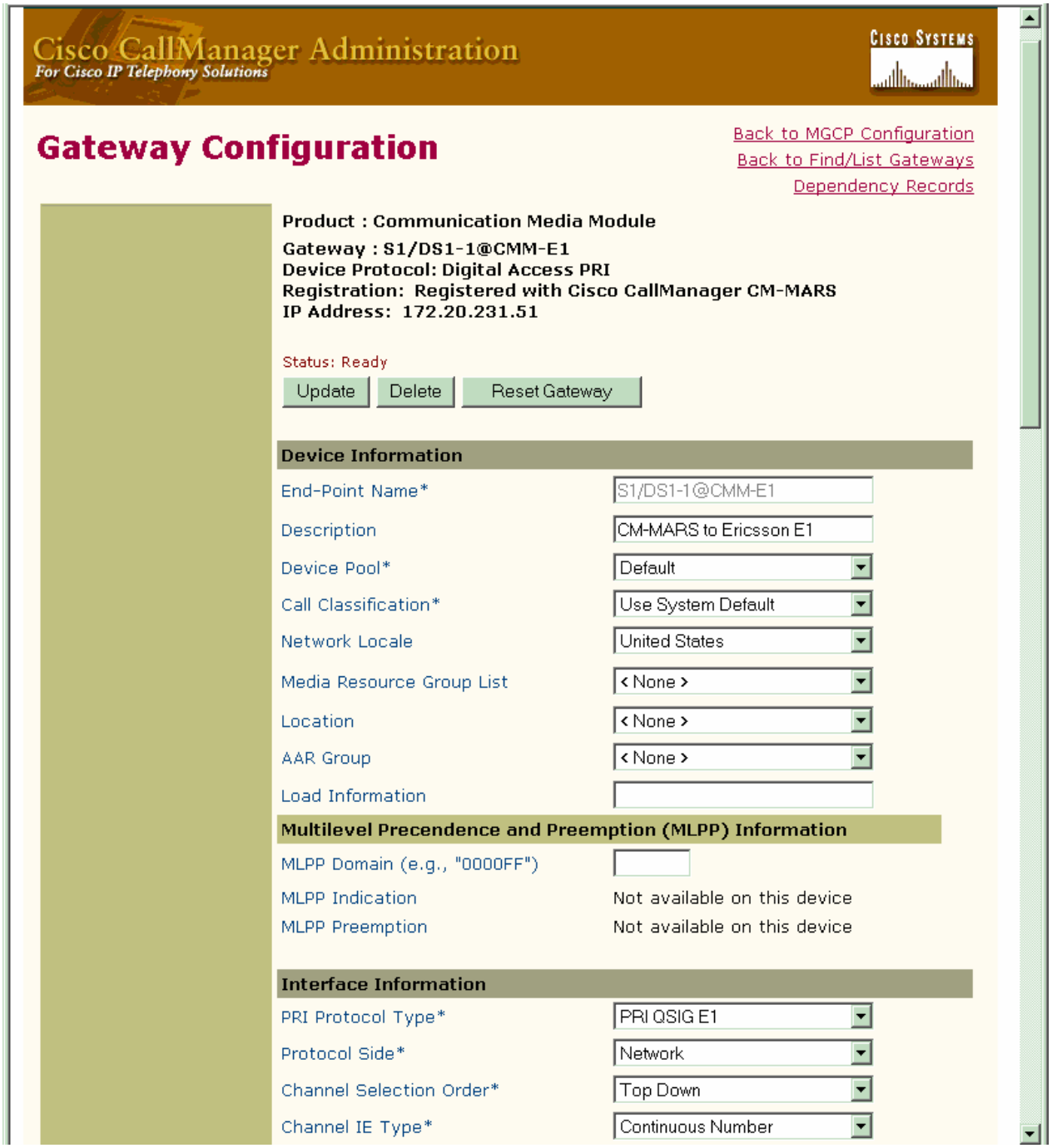


Figure 5. CMM-E1 Gateway Configuration (continued)

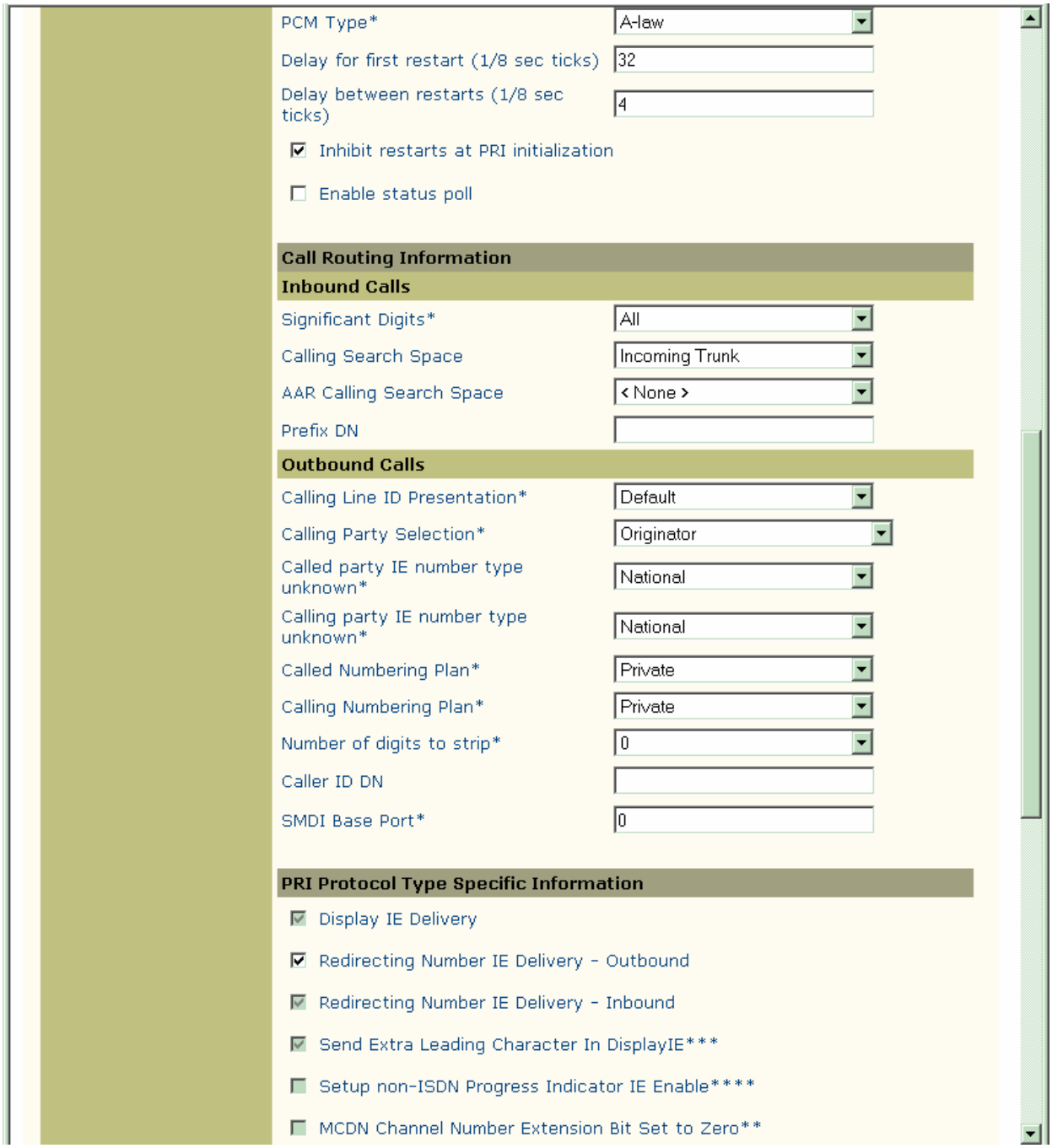


Figure 6. CMM-E1 Gateway Configuration (continued)

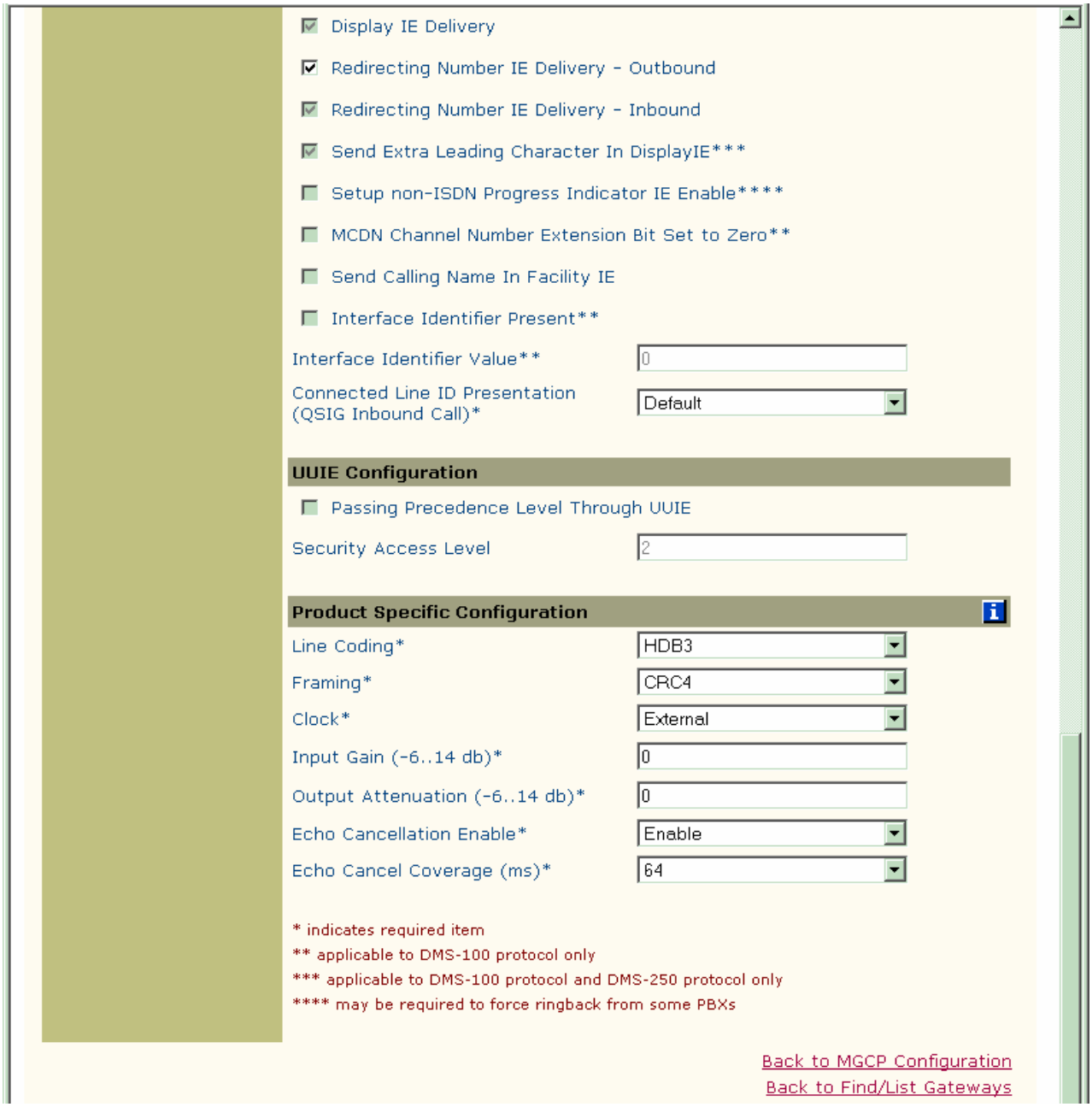


Figure 7. Enbloc Route Pattern Configuration

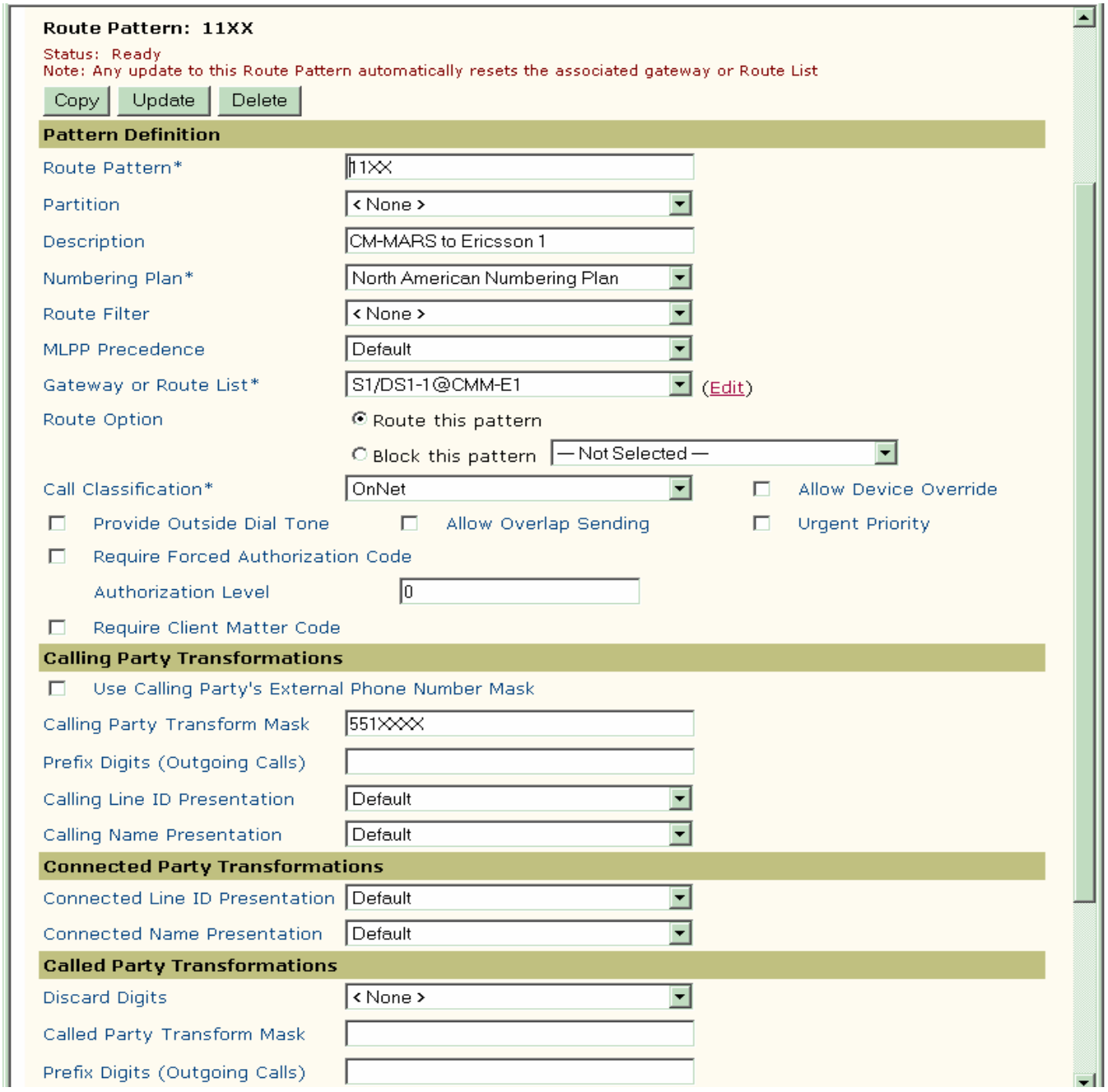


Figure 8. MWI lamp On/Off Configuration

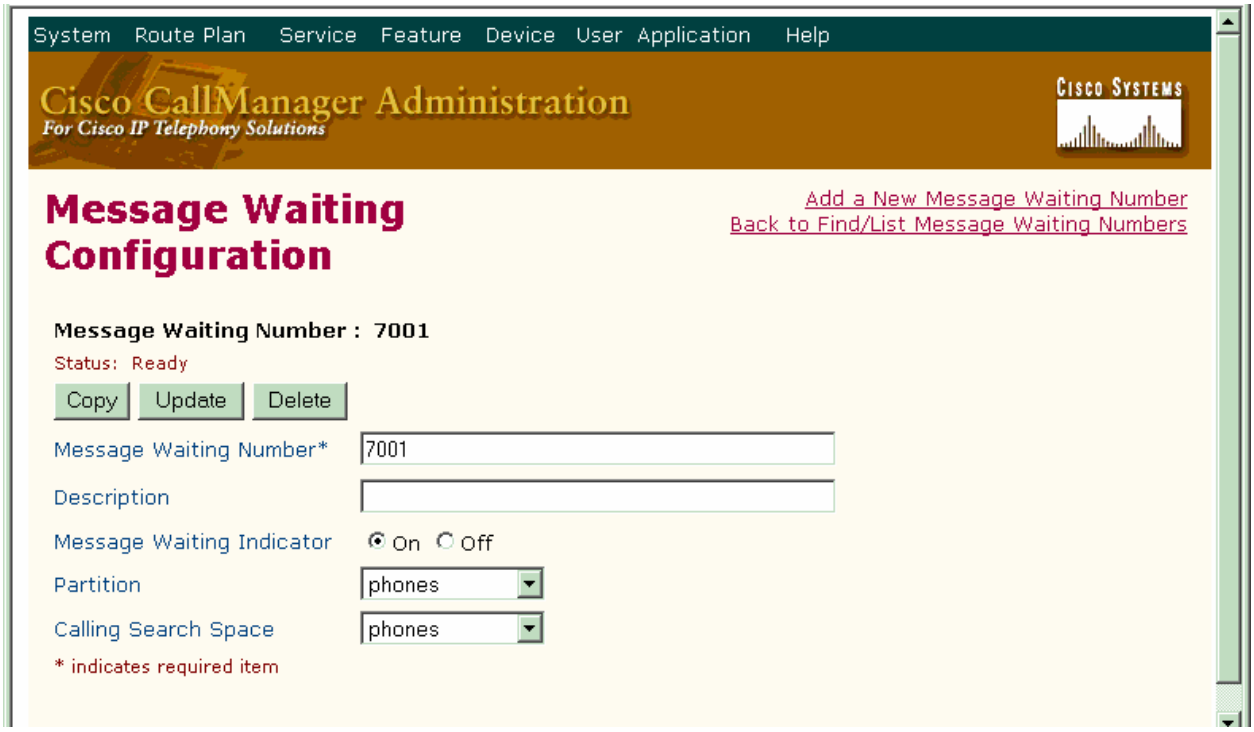


Figure 9. MWI lamp On/Off Configuration (continue)

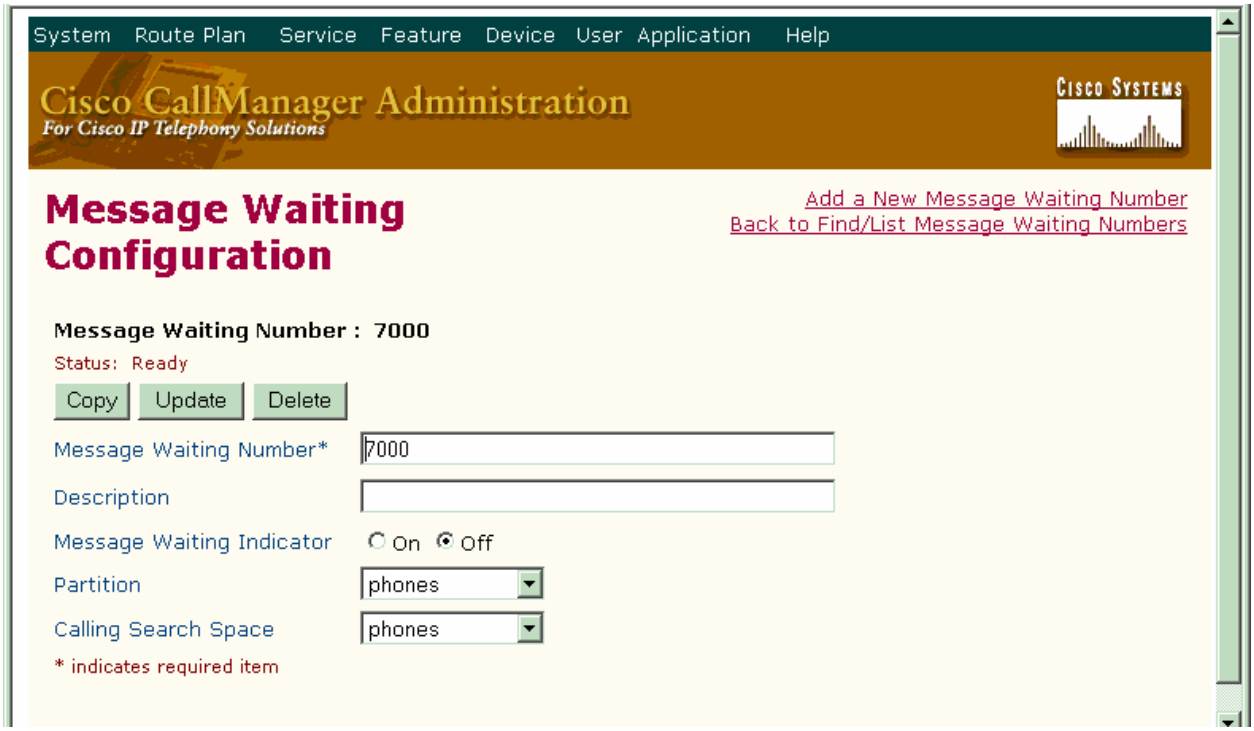


Figure 10. MWI Activate Translation Pattern Configuration

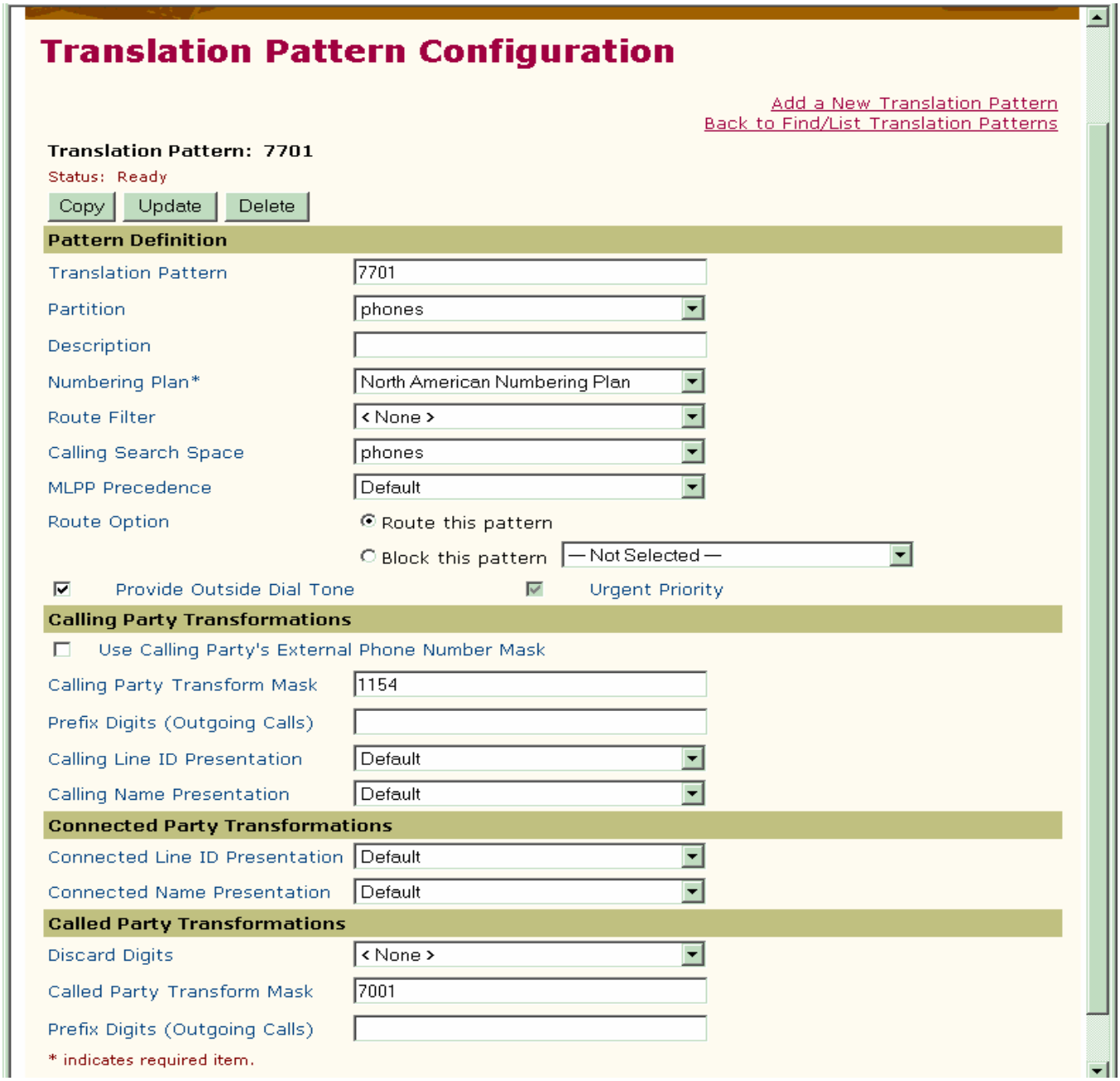


Figure 11. MWI Deactivate Translation Pattern Configuration

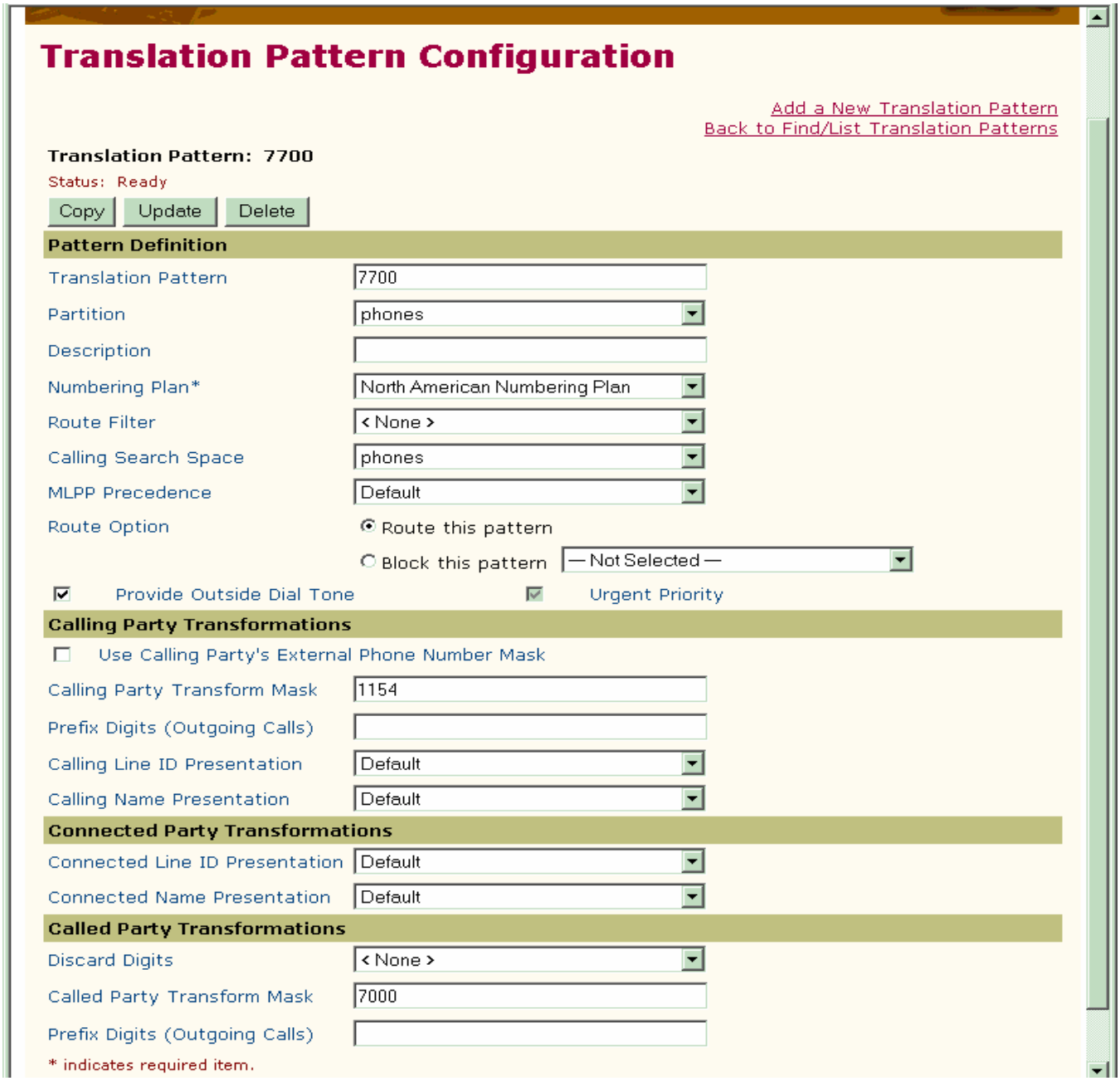


Figure 12. CallBack Service Parameters

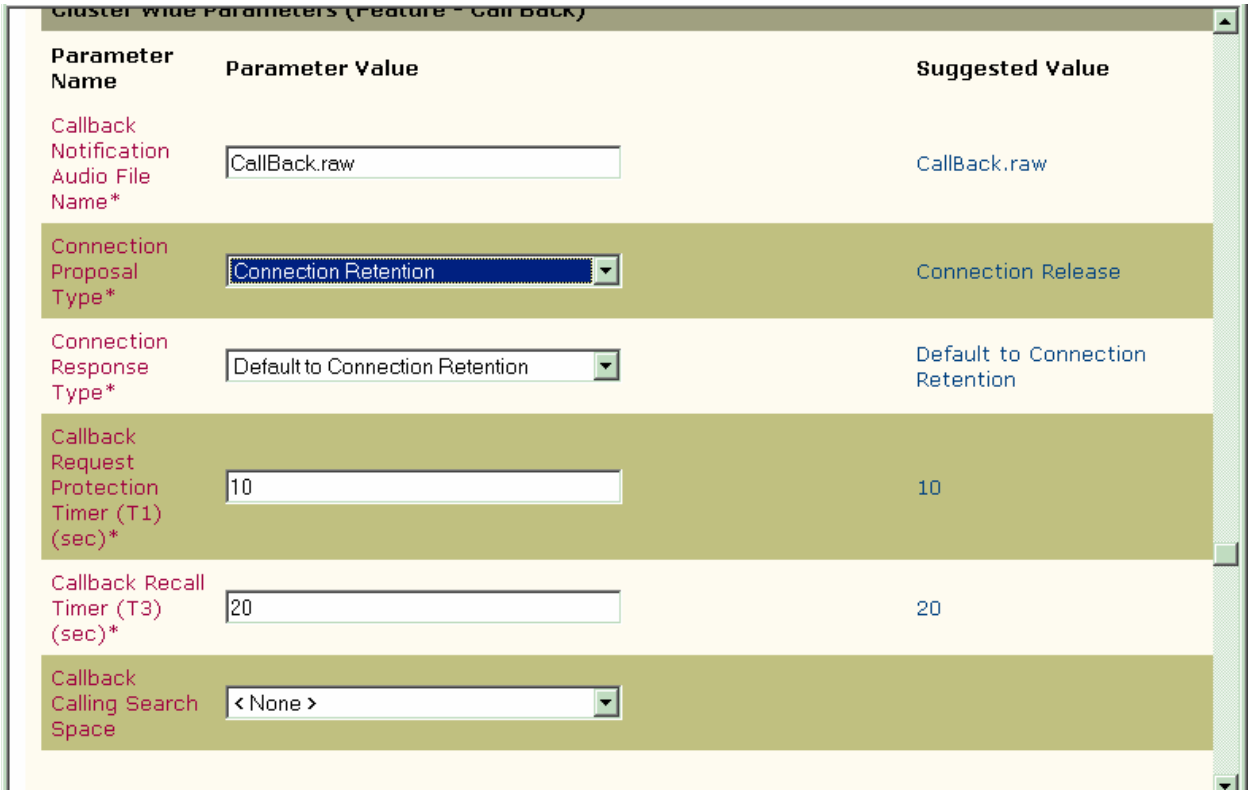


Figure 13. CallBack Softkey Configuration

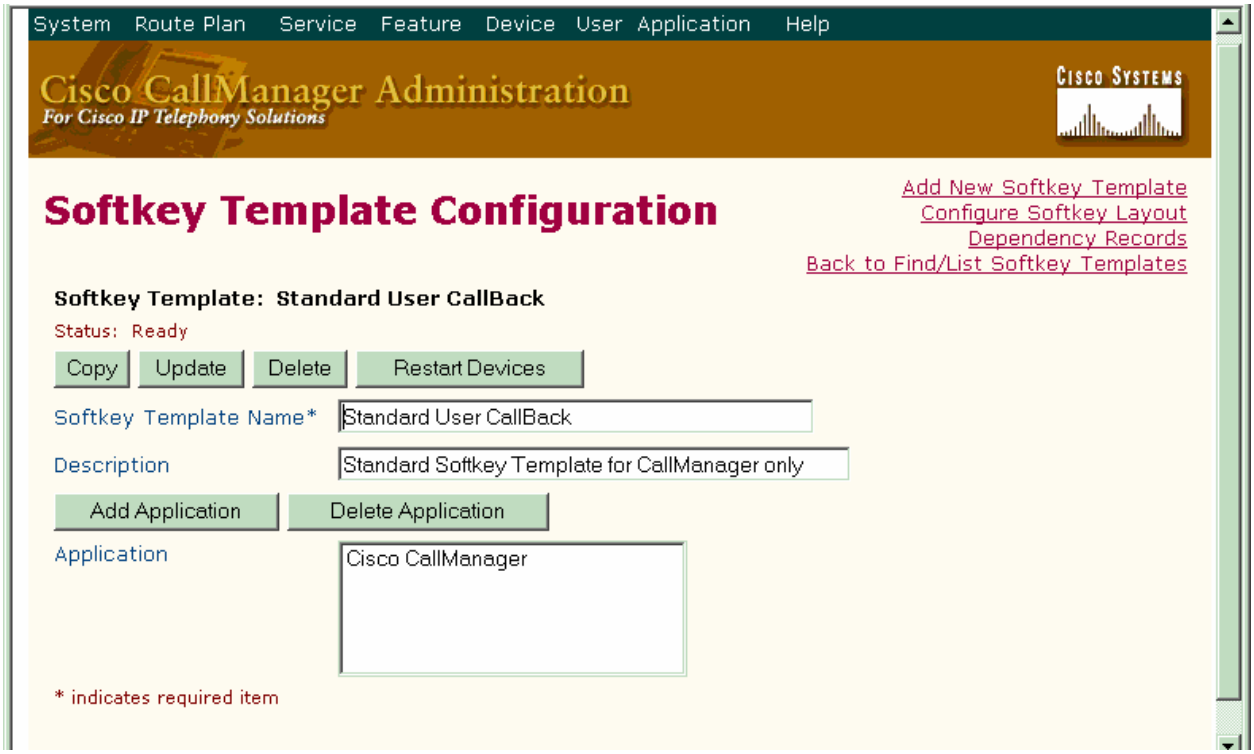


Figure 14. CallBack Softkey Configuration (continued)

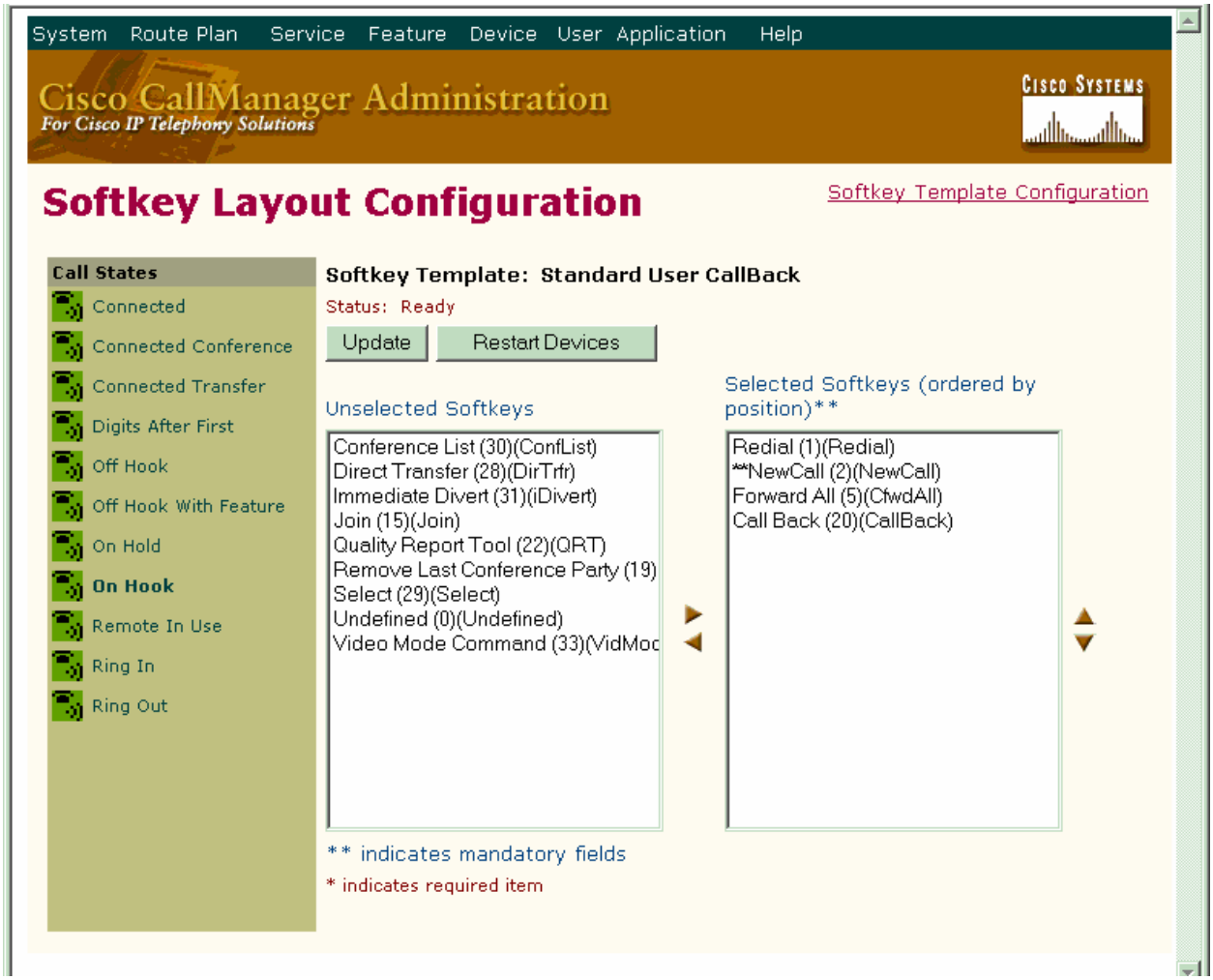


Figure 15. CallBack Softkey Configuration (continued)

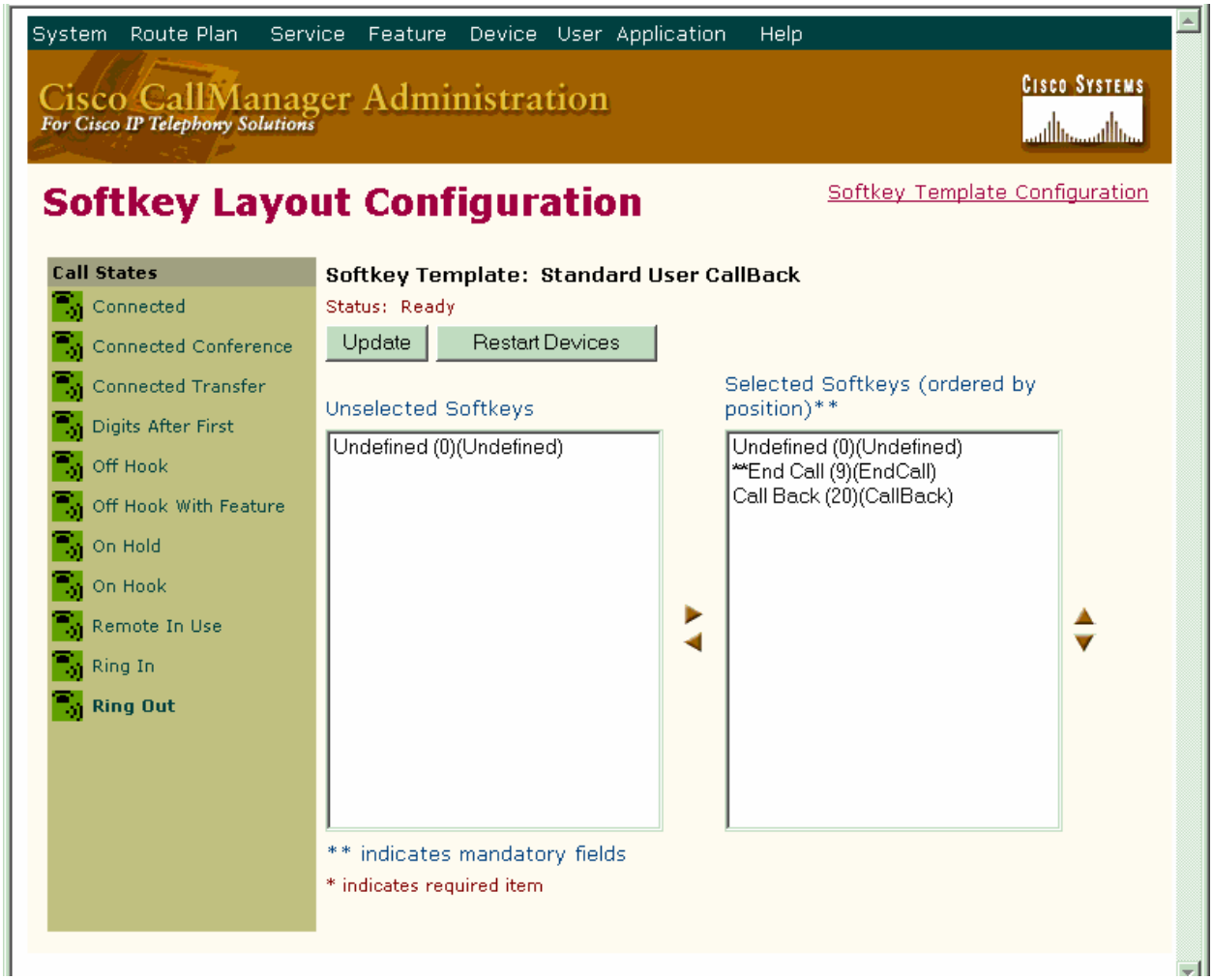
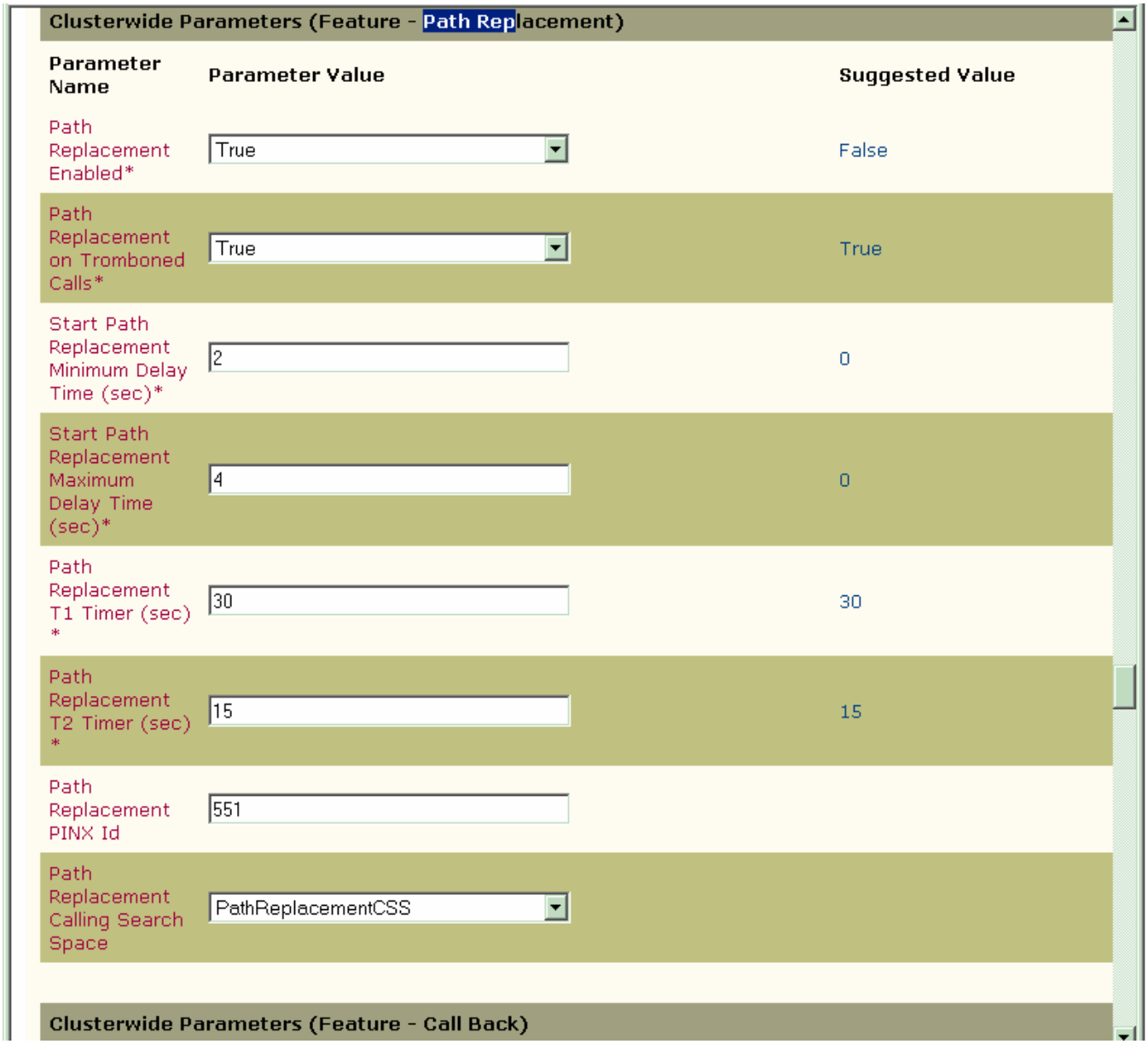


Figure 16. Path Replacement Service Parameters



Clusterwide Parameters (Feature - Path Replacement)

Parameter Name	Parameter Value	Suggested Value
Path Replacement Enabled*	True	False
Path Replacement on Tromboned Calls*	True	True
Start Path Replacement Minimum Delay Time (sec)*	2	0
Start Path Replacement Maximum Delay Time (sec)*	4	0
Path Replacement T1 Timer (sec)*	30	30
Path Replacement T2 Timer (sec)*	15	15
Path Replacement PINX Id	551	
Path Replacement Calling Search Space	PathReplacementCSS	

Clusterwide Parameters (Feature - Call Back)

Figure 17. Path Replacement Service Parameters

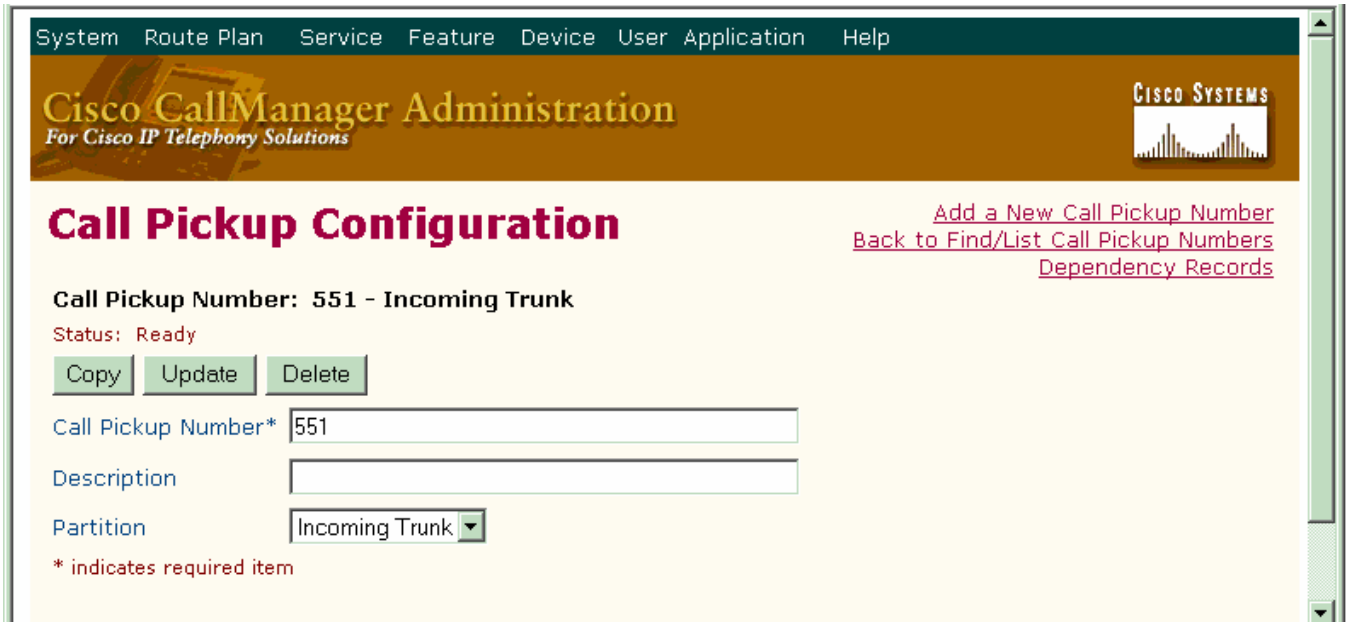


Figure 18. Forward by Reroute Service Parameter

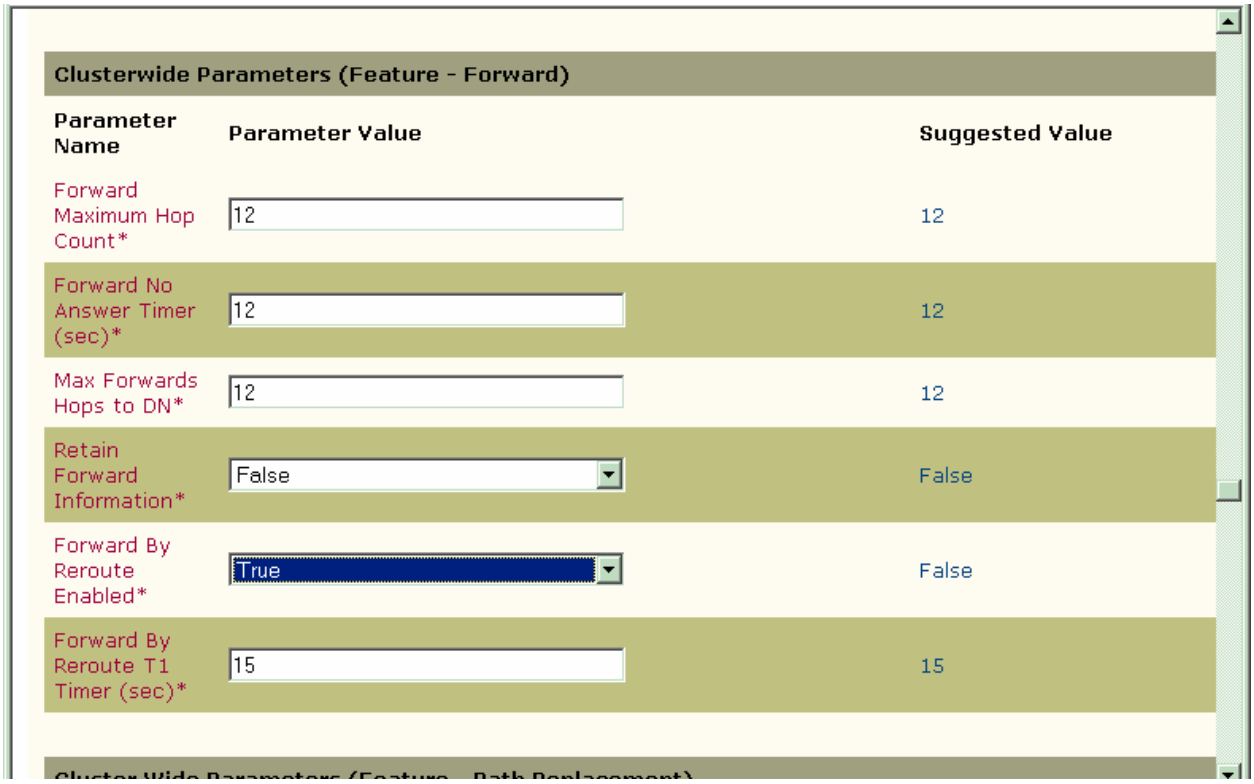


Figure 19. IP phone Configuration

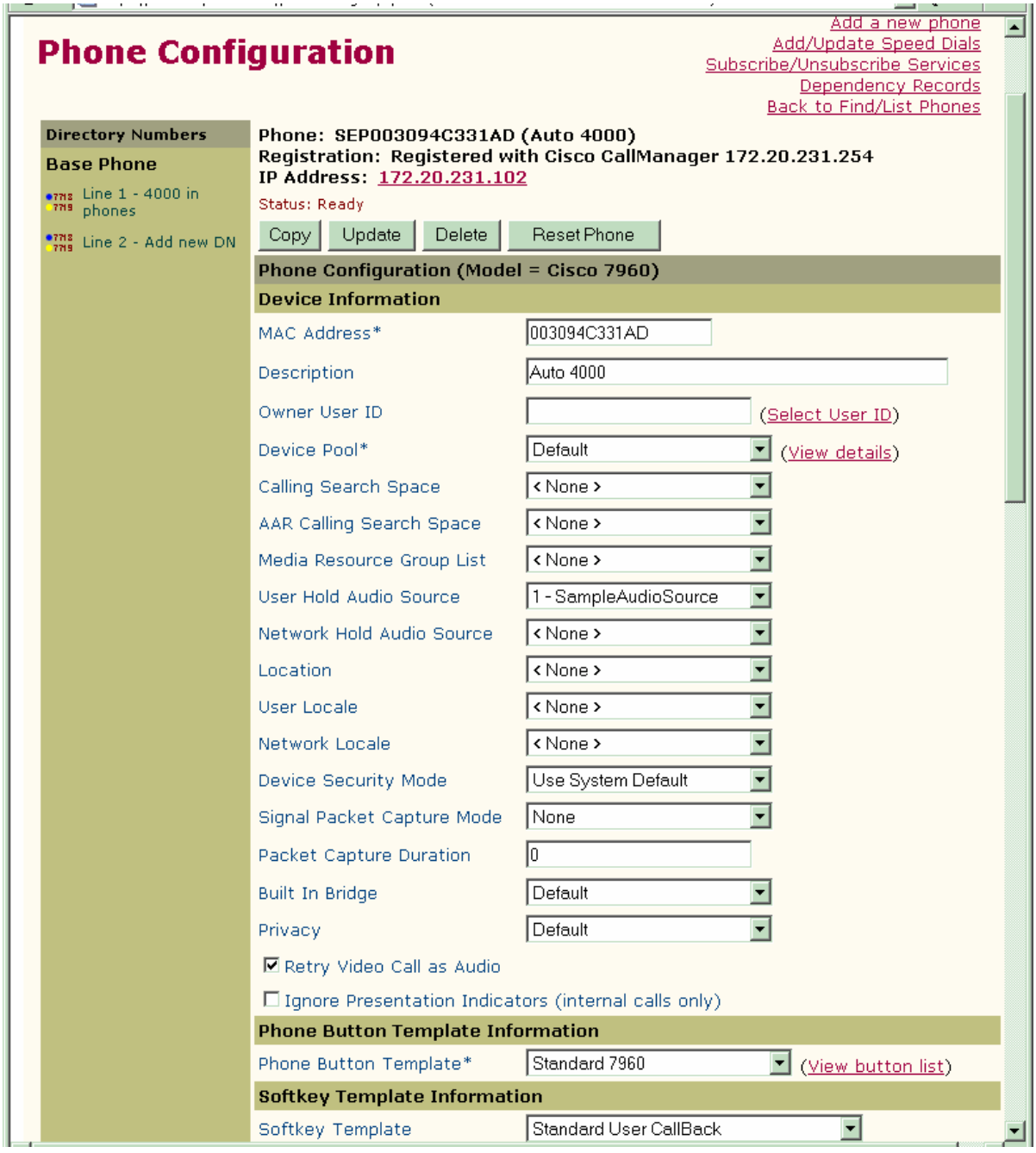


Figure 20. IP phone Configuration (continued)

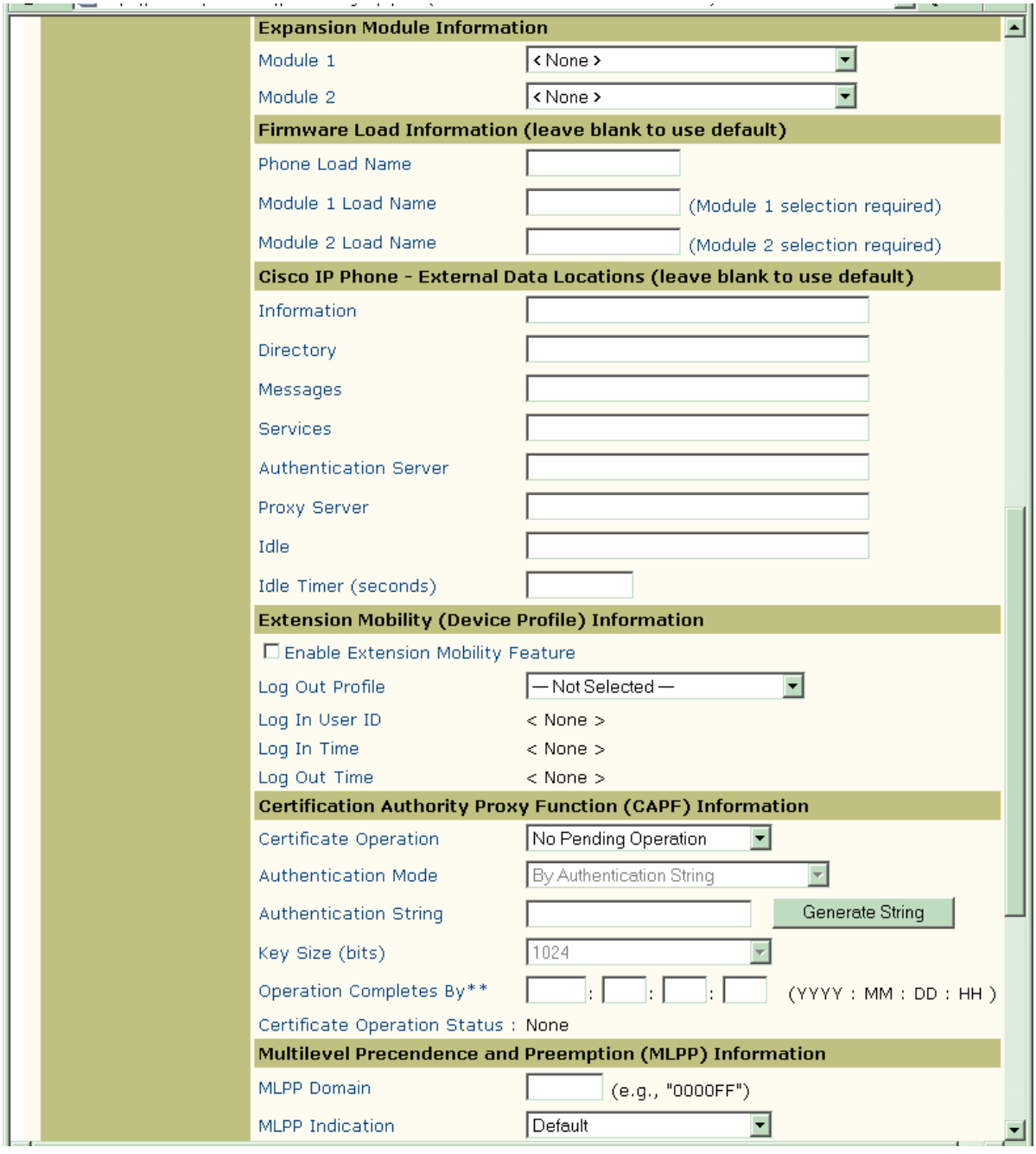


Figure 21. IP phone Configuration (continued)

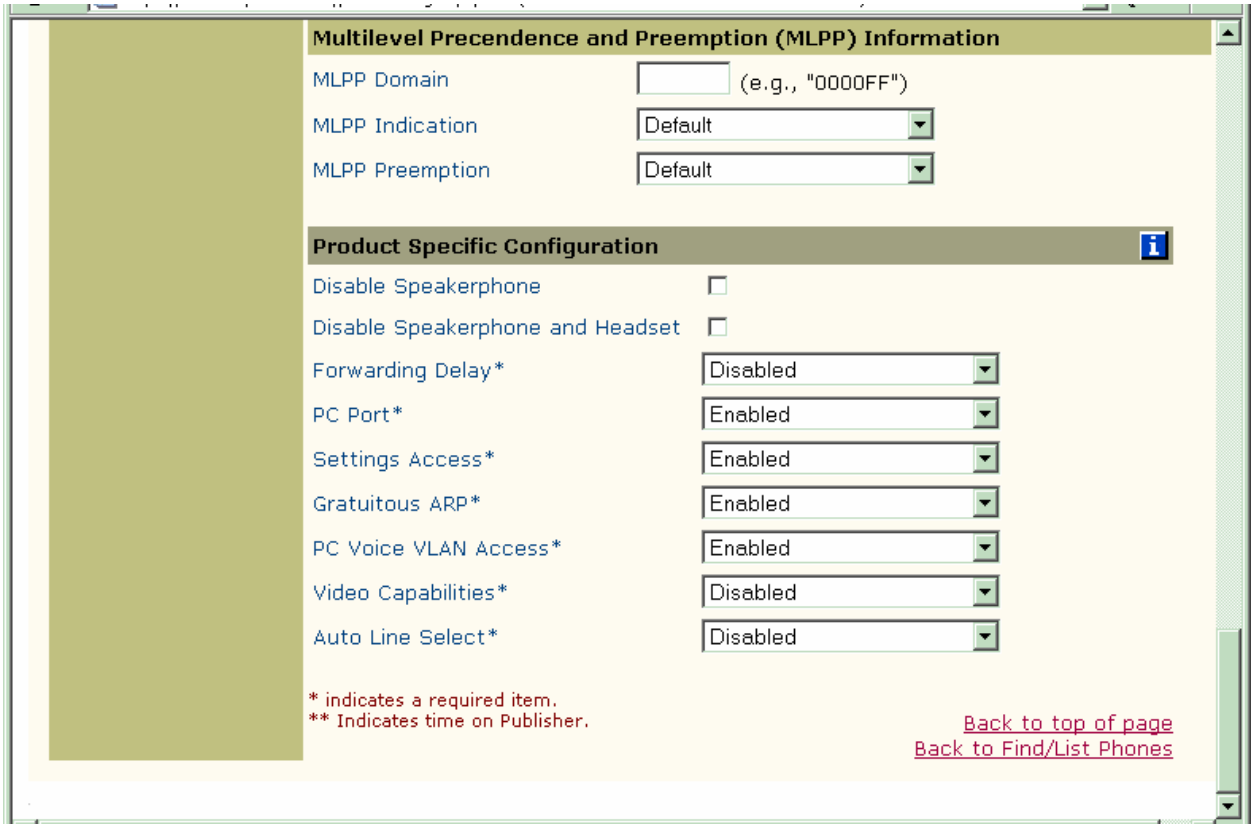


Figure 22. IP phone Configuration (continued)

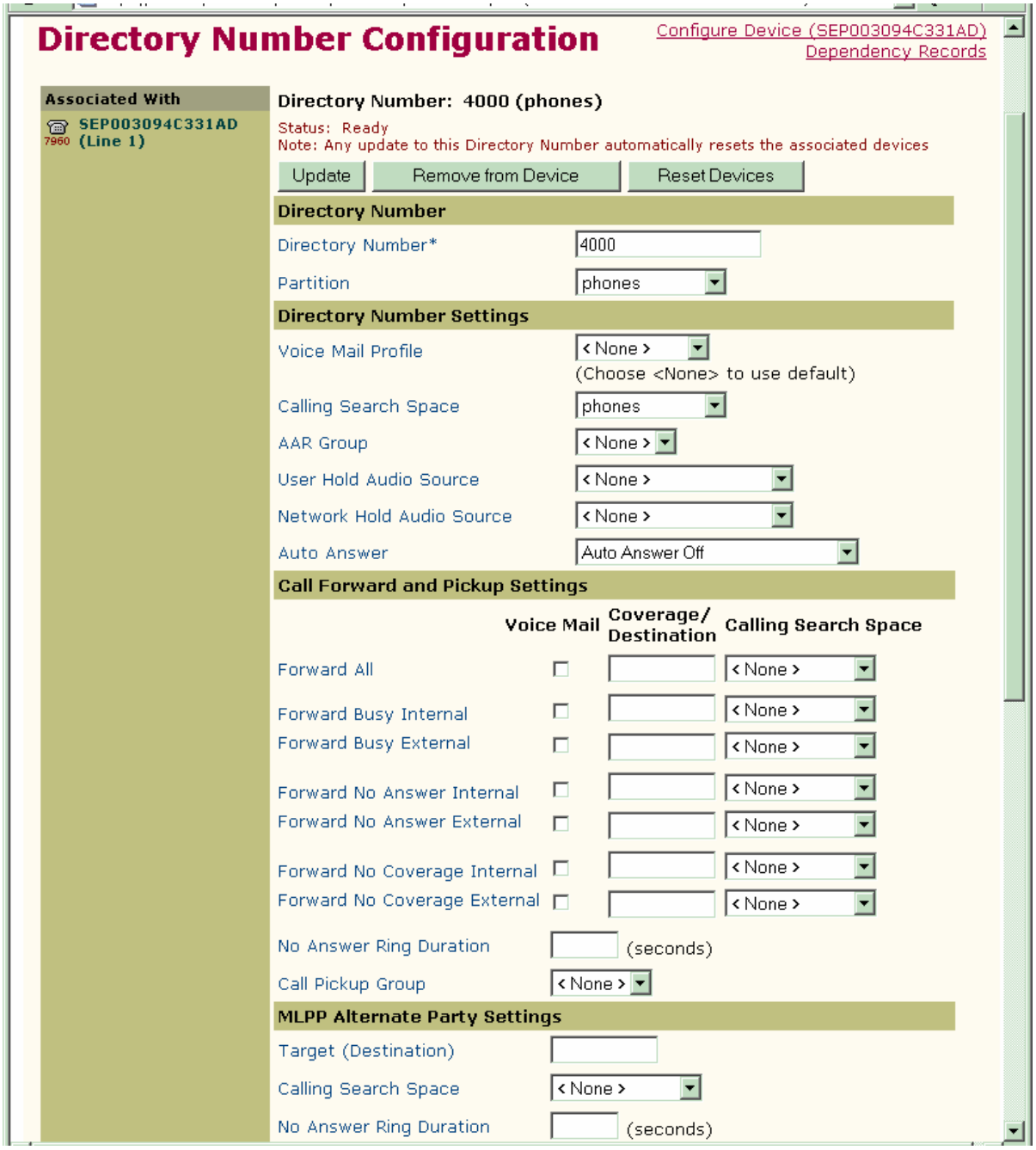
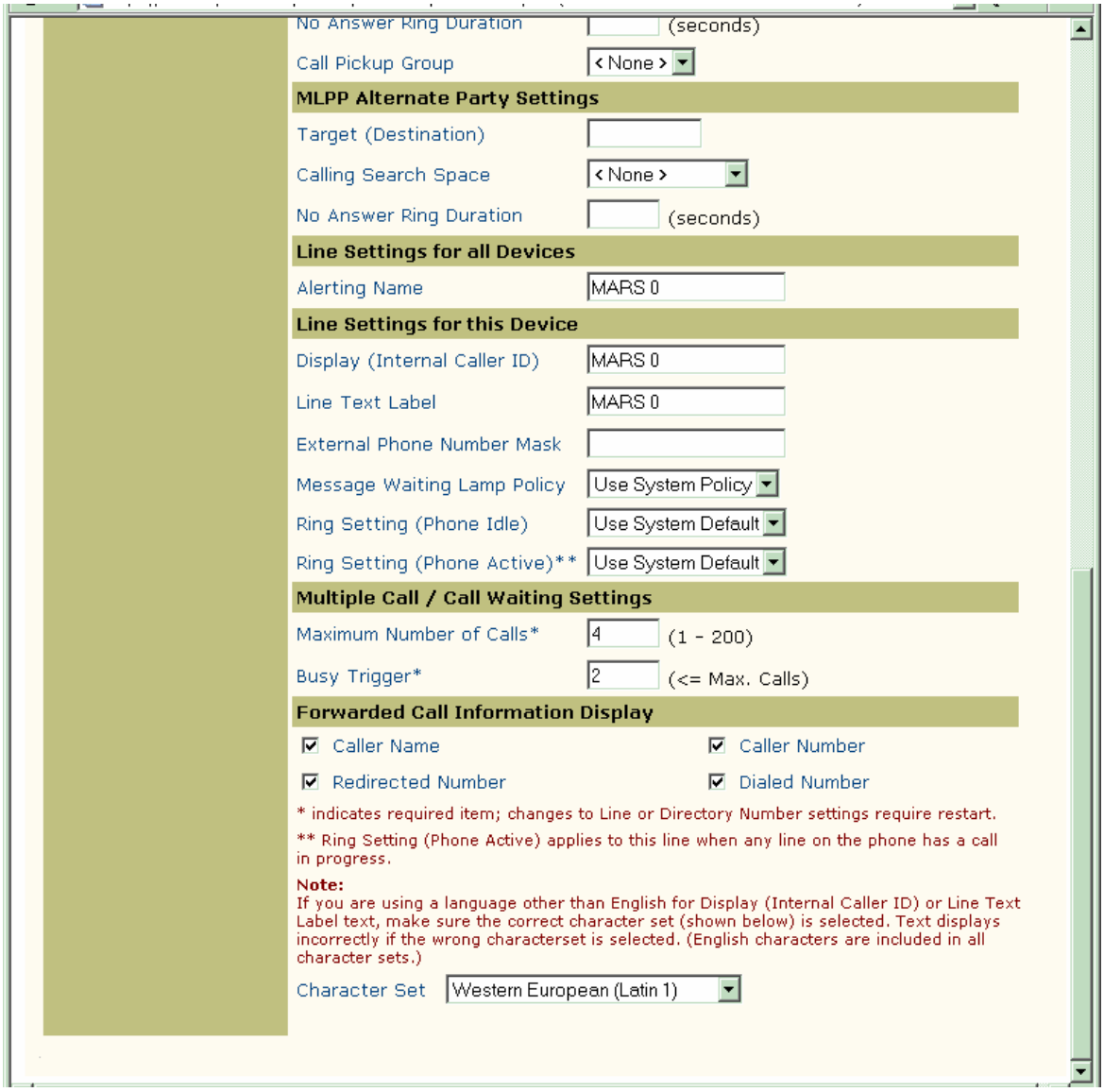


Figure 23. IP phone Configuration (continued)



Configuring the Cisco IOS Gateway

```
tony3845#sh run

Building ...


Current configuration : 2066 bytes

!

version 12.3

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname tony3845

!

boot-start-marker

boot-end-marker

!

enable password cisco

!

no aaa new-model

!

resource policy

!

no network-clock-participate slot 4

no network-clock-participate wic 0

voice-card 0

 no dspfarm

!
```

```
voice-card 4
 dspfarm
!
ip subnet-zero
ip cef
!
!
no ip dhcp use vrf connected
!
!
ip host CM-MARS 172.20.231.254
no ftp-server write-enable
isdn switch-type primary-4ess
!
!
!
controller T1 0/0/0
 framing esf
 linecode b8zs
!
controller T1 0/0/1
 framing esf
 linecode b8zs
!
controller E1 4/0/0
 pri-group timeslots 1-31 service mgcp
!
controller E1 4/0/1
!
```

```
!
!
interface GigabitEthernet0/0
 ip address 172.20.231.245 255.255.255.0
 duplex half
 speed 100
 media-type rj45
 negotiation auto
!
interface GigabitEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
 media-type rj45
 negotiation auto
!
interface Serial4/0/0:15
 no ip address
 isdn switch-type primary-qsig
 isdn protocol-emulate network
 isdn incoming-voice voice
 isdn T310 120000
 isdn bind-l3 ccm-manager
 no cdp enable
!
ip default-gateway 172.20.231.1
ip classless
ip route 0.0.0.0 0.0.0.0 172.20.231.1
```

```
!
ip http server
!
!
control-plane
!
!
!
voice-port 4/0/0:15
!
ccm-manager mgcp
ccm-manager music-on-hold
ccm-manager config server CM-MARS
ccm-manager config
!
mgcp
mgcp call-agent CM-MARS 2427 service-type mgcp version 0.1
mgcp dtmf-relay voip codec all mode out-of-band
mgcp rtp unreachable timeout 1000 action notify
mgcp modem passthrough voip mode nse
mgcp package-capability rtp-package
no mgcp package-capability res-package
mgcp package-capability sst-package
no mgcp package-capability fxr-package
mgcp package-capability pre-package
no mgcp timer receive-rtcp
mgcp sdp simple
mgcp fax t38 inhibit
mgcp rtp payload-type g726r16 static
```

```
!
mgcp profile default
!
!
!
!
line con 0
 password cisco
 stopbits 1
line aux 0
 stopbits 1
line vty 0 4
 password cisco
 login
!
scheduler allocate 20000 1000
!
end


tony3845#
```

Configuring the Westell IiQ2000

Figure 24. IiQ2000 Shelf Definitions

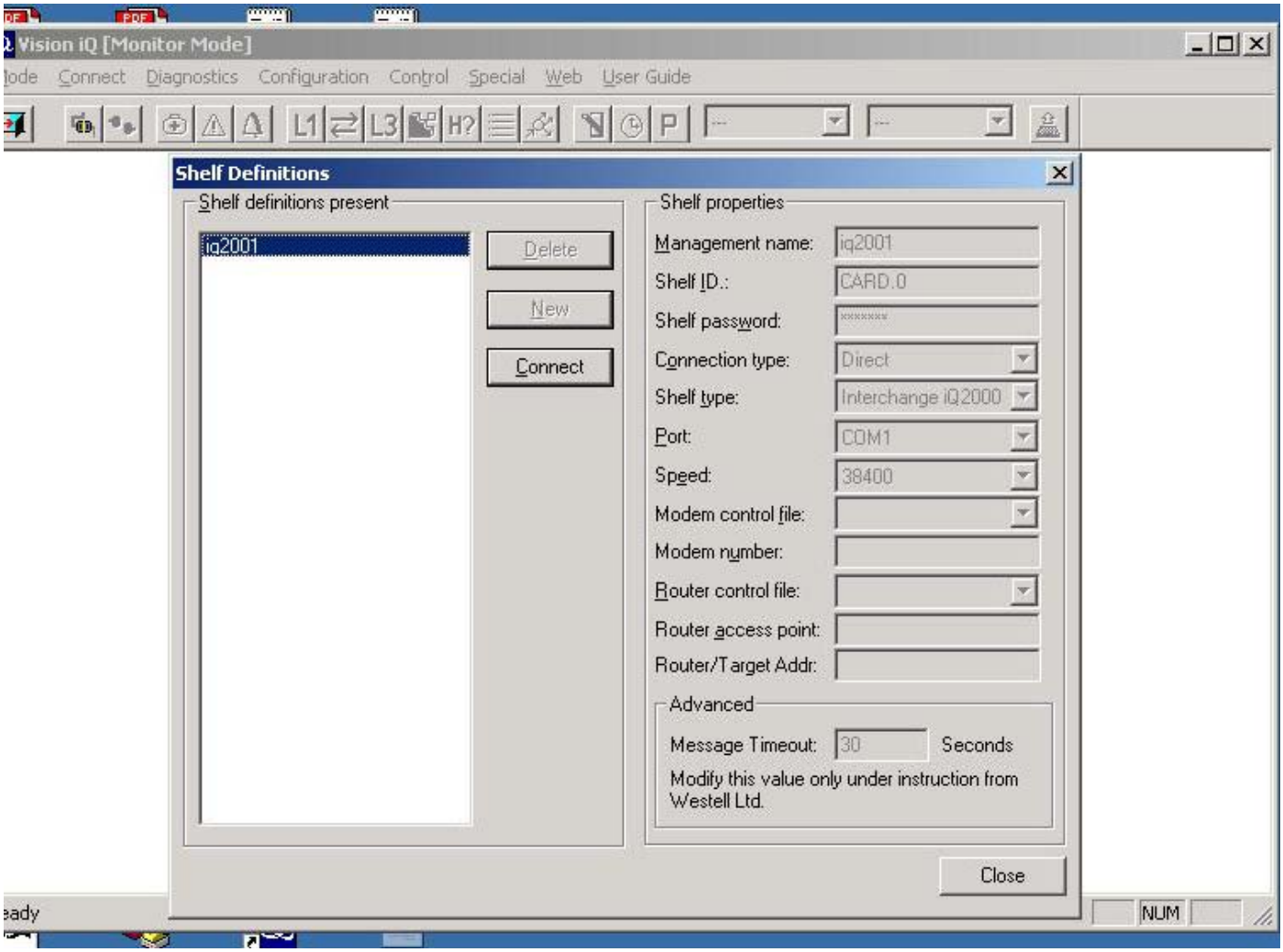


Figure 25. Entering the IiQ2000 configuration

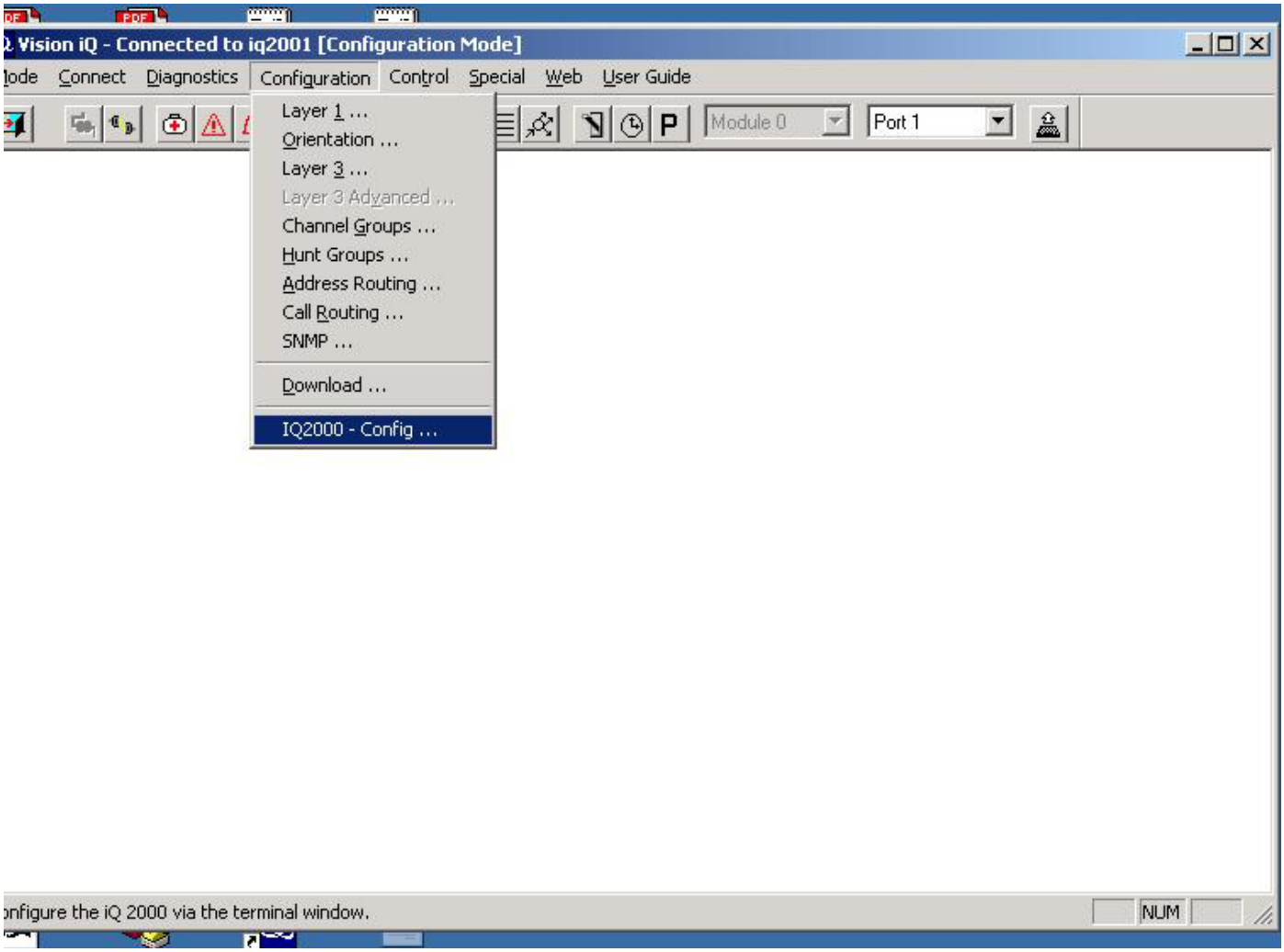


Figure 26. Configuration Warning: Click “yes”.

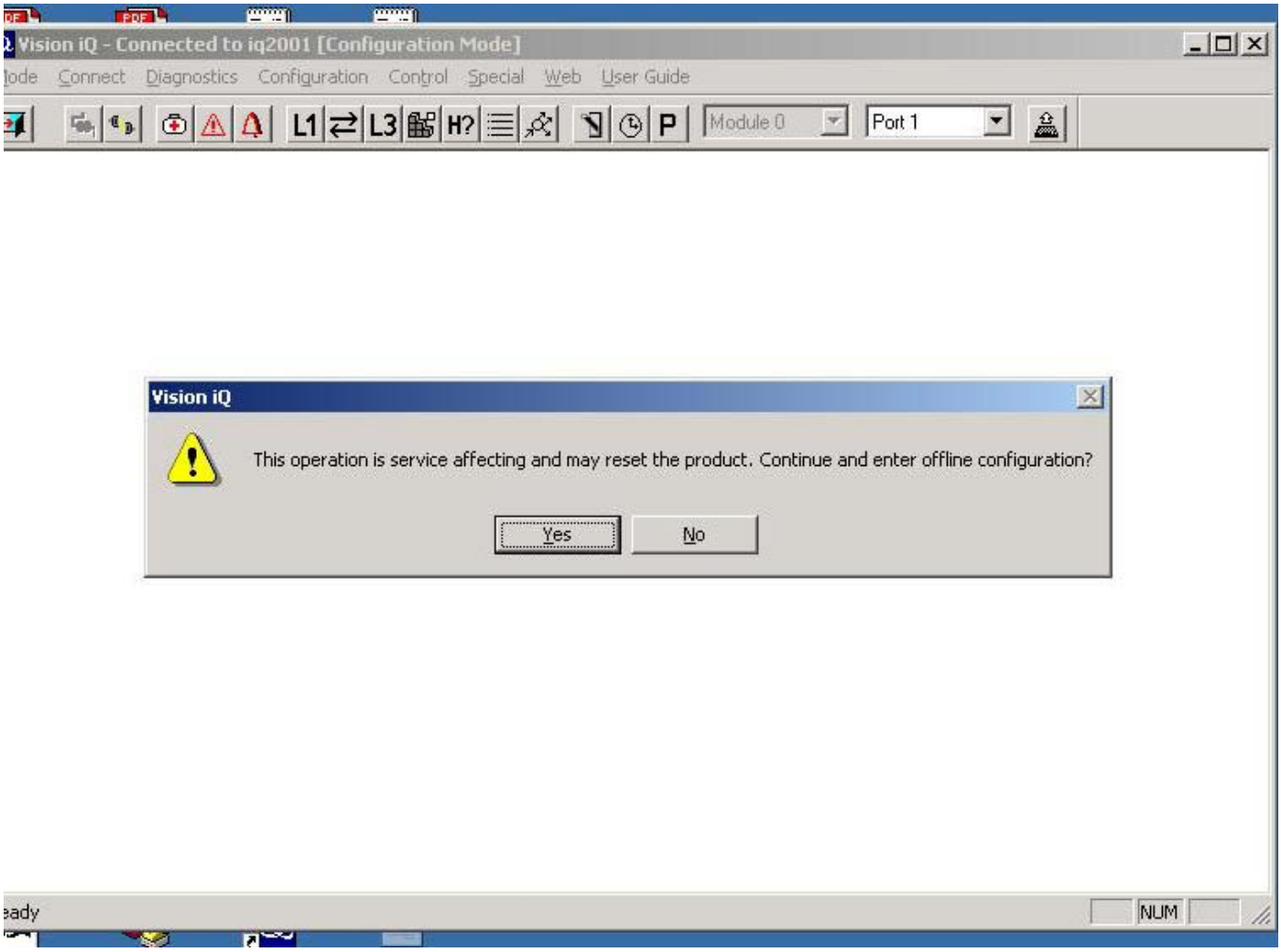


Figure 27. IiQ2000 Configuration Command Line Interface: Hit RETURN.

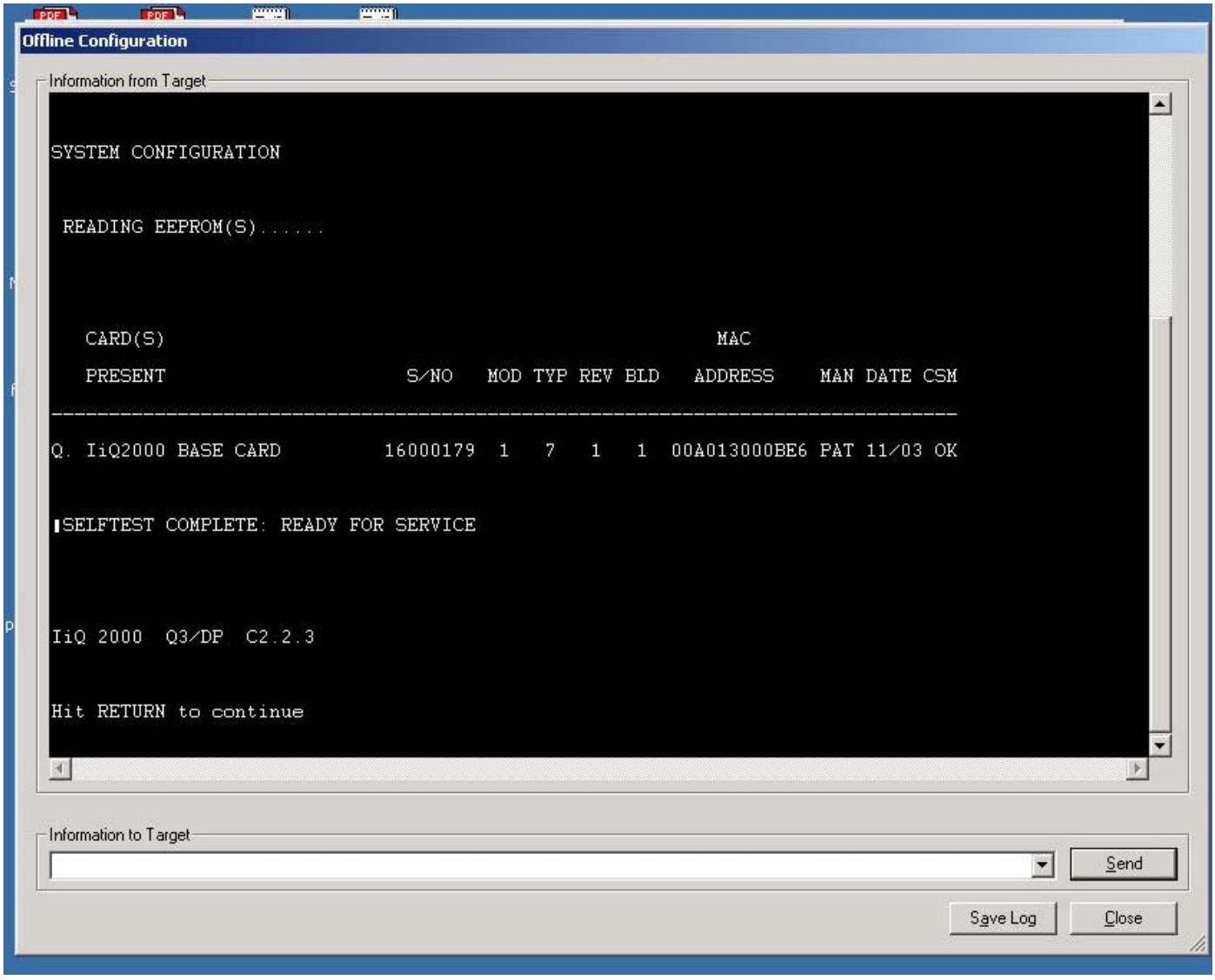


Figure 28. Selecting configuration option: Select QUICK.

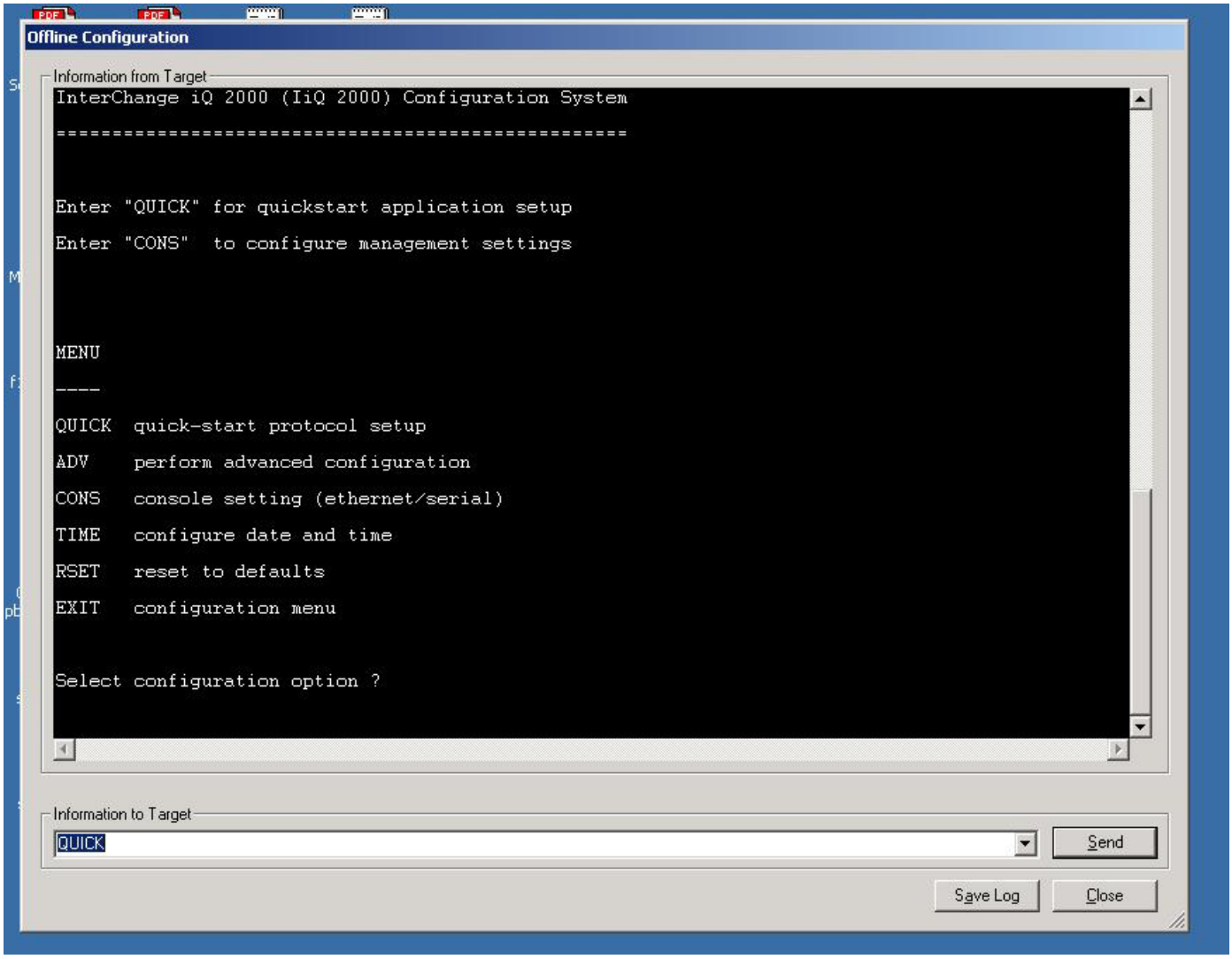


Figure 29. Configuration Instructions: Hit RETURN.

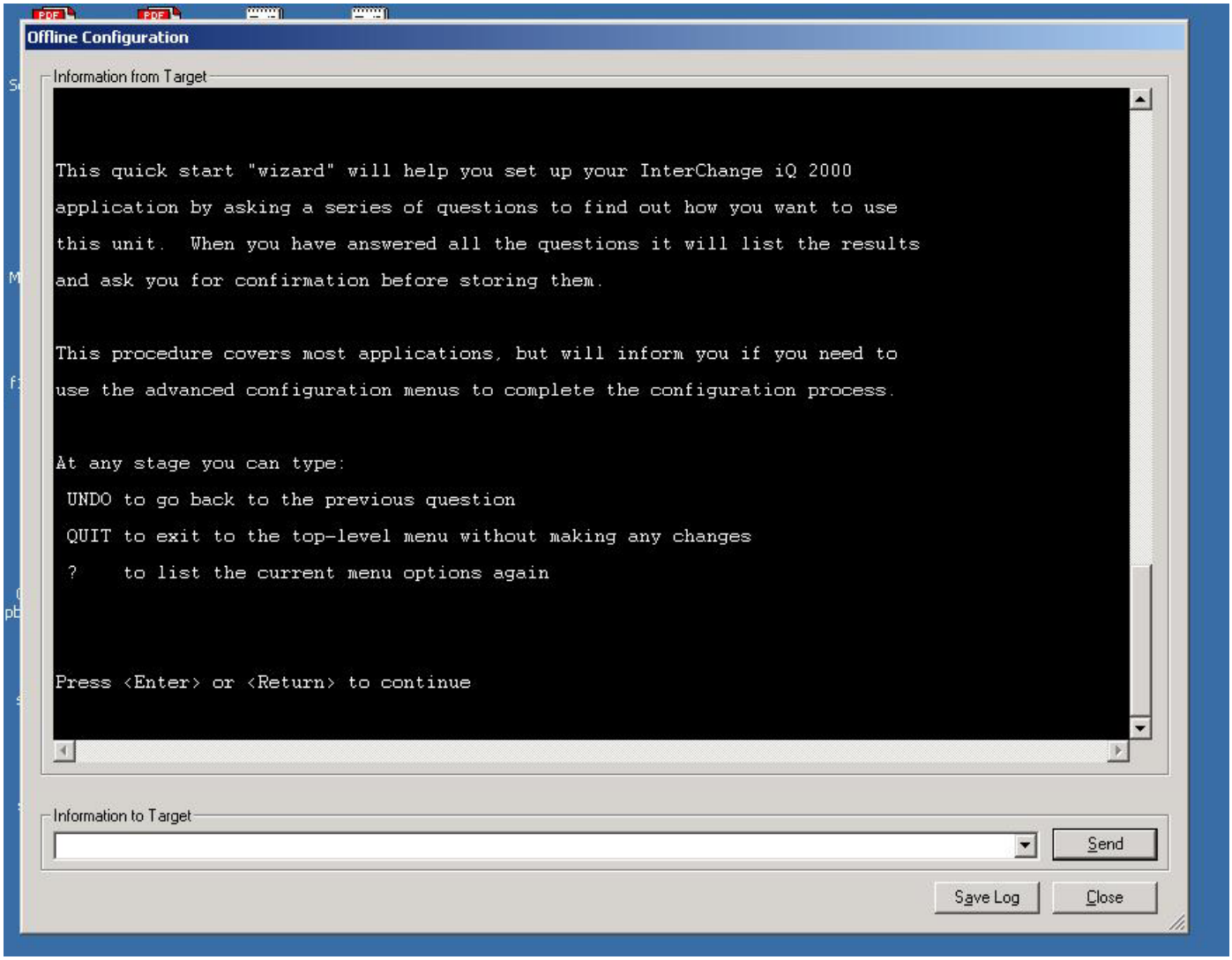


Figure 30. Application description menu: Select QSIG.

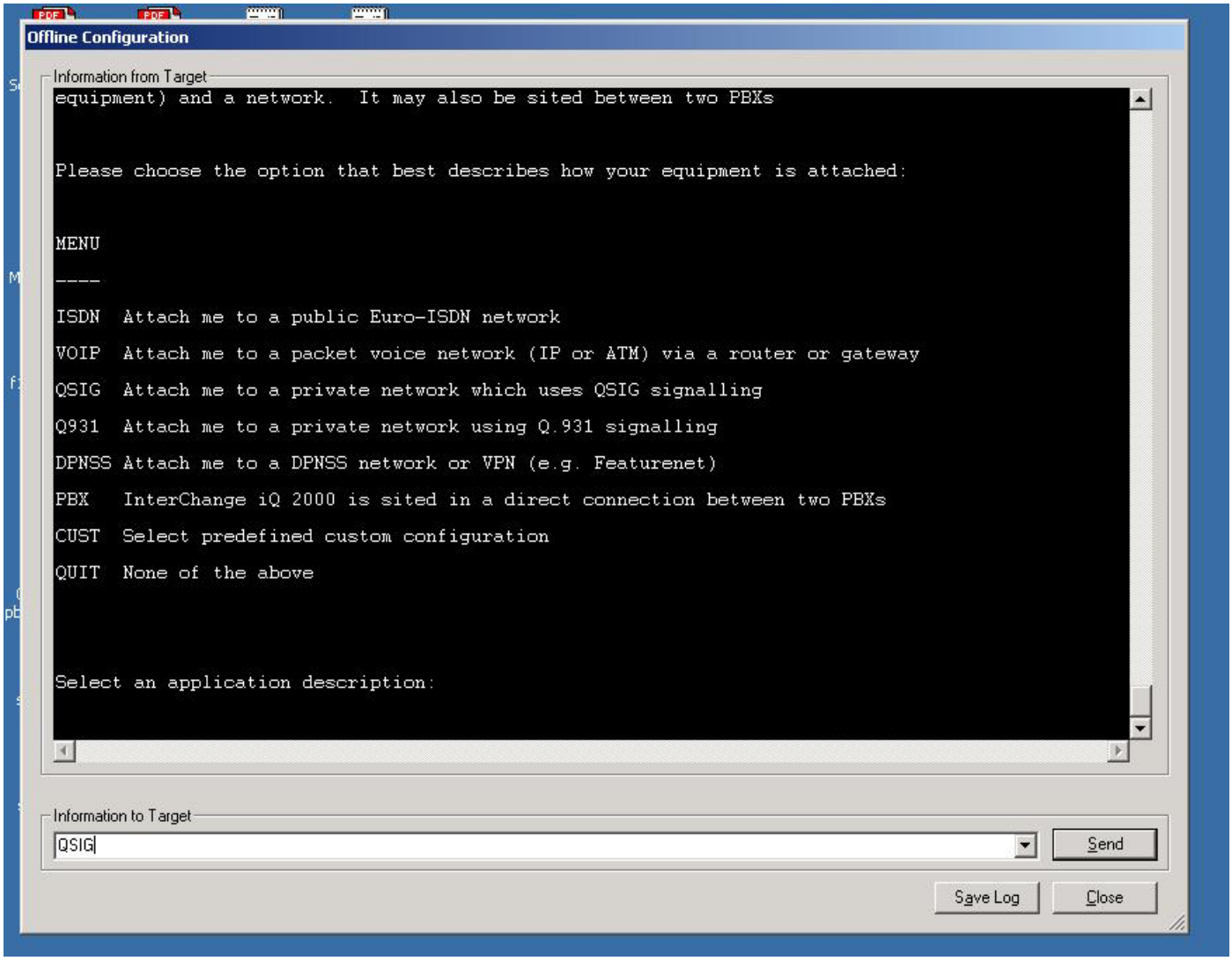


Figure 31. Selecting a QSIG variant: Select ISO.

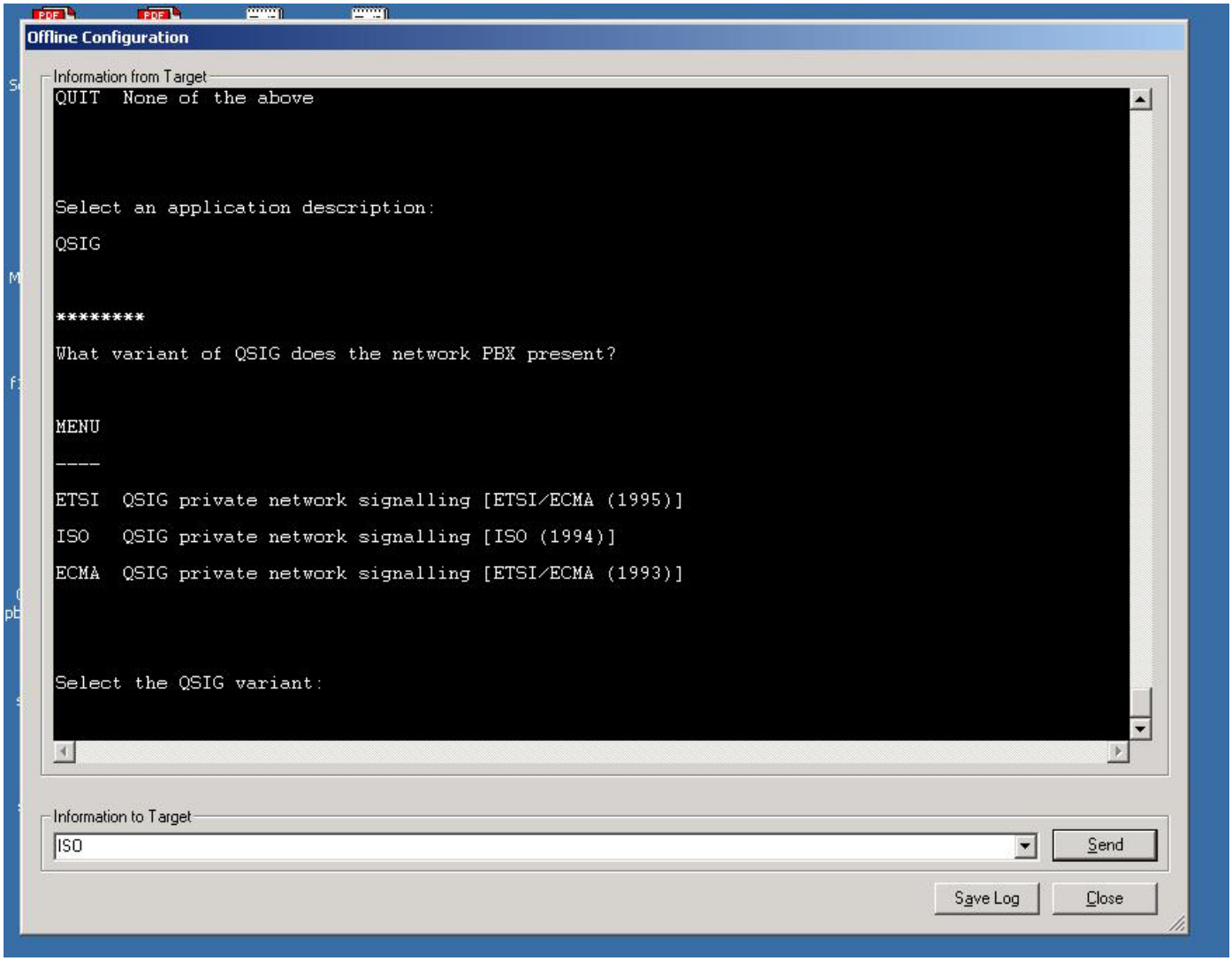


Figure 32. Selecting Network/User: Select NET.

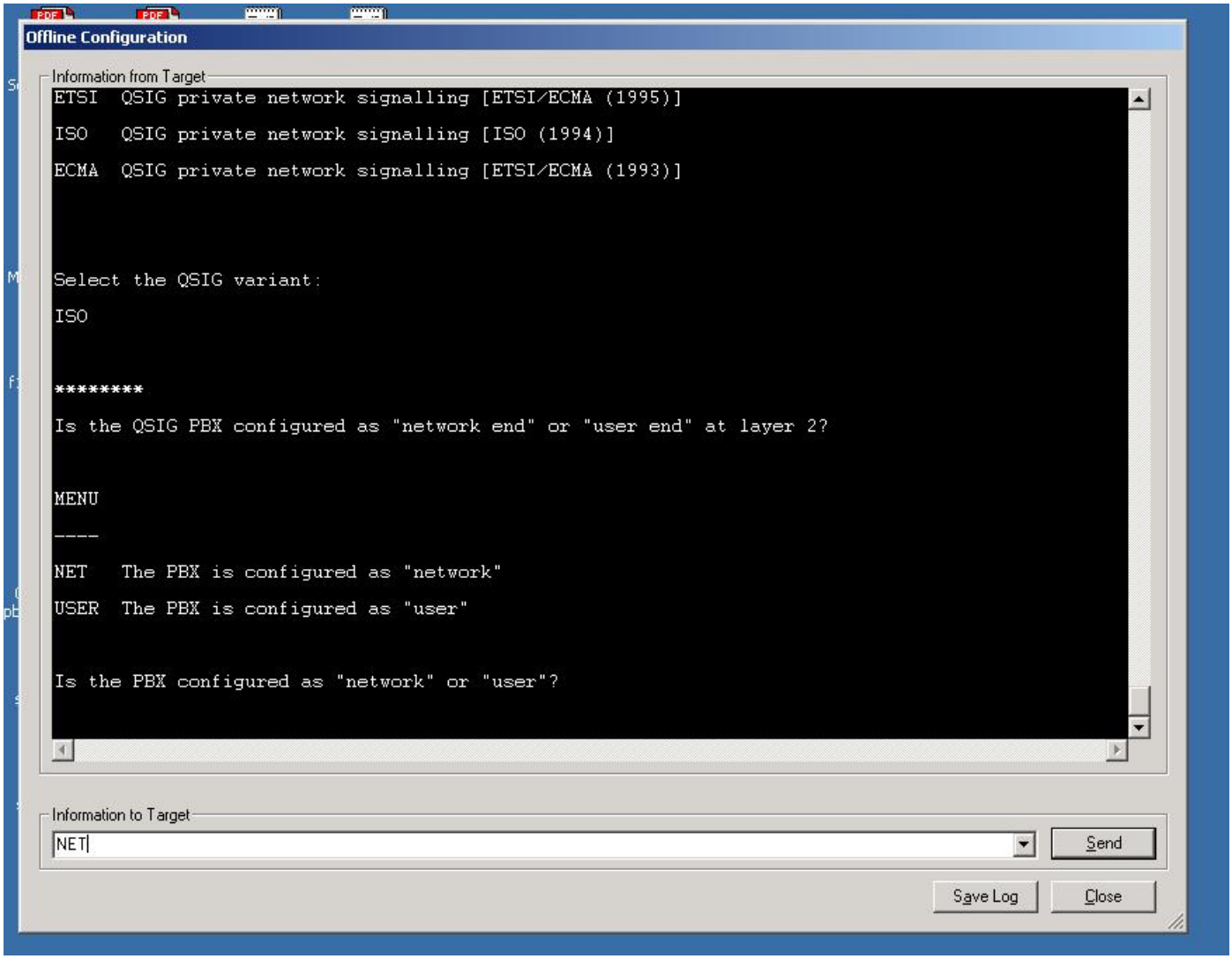


Figure 33. Selecting A/B sides: Select 'A'.

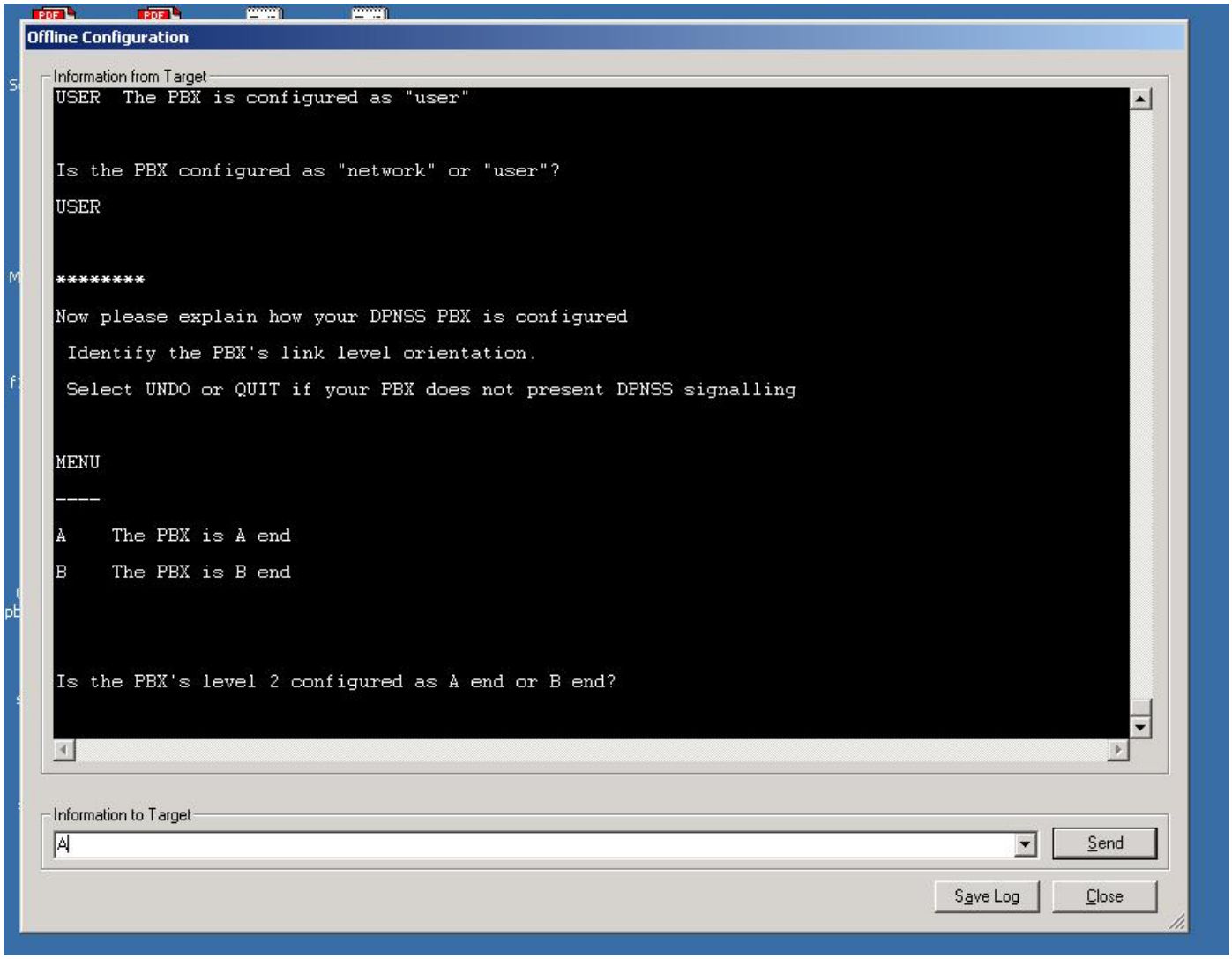


Figure 34. Selecting channel priorities: Select 'XX'.

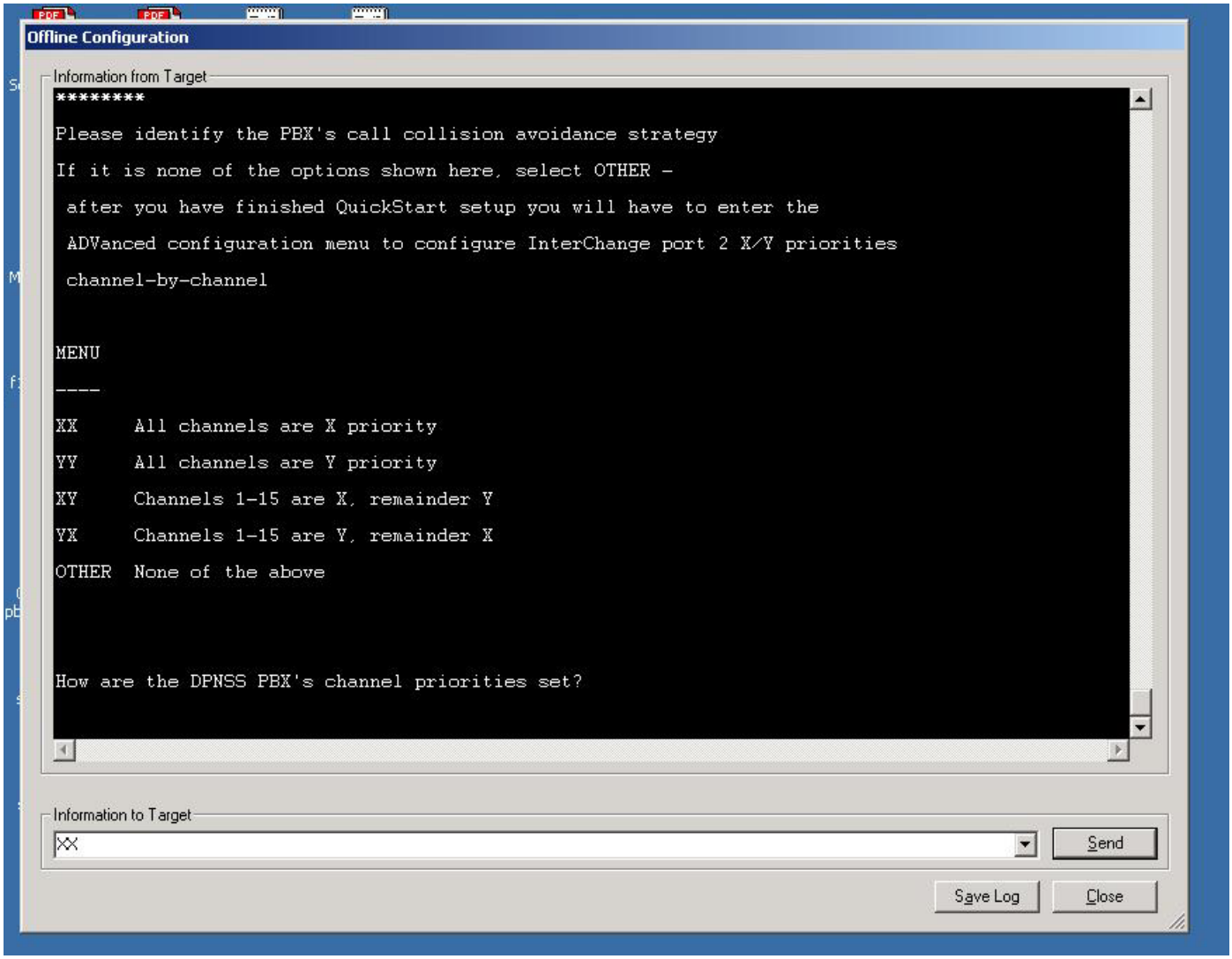


Figure 35. Prompt for PBXs connected to network without IiQ2000: Select NO.

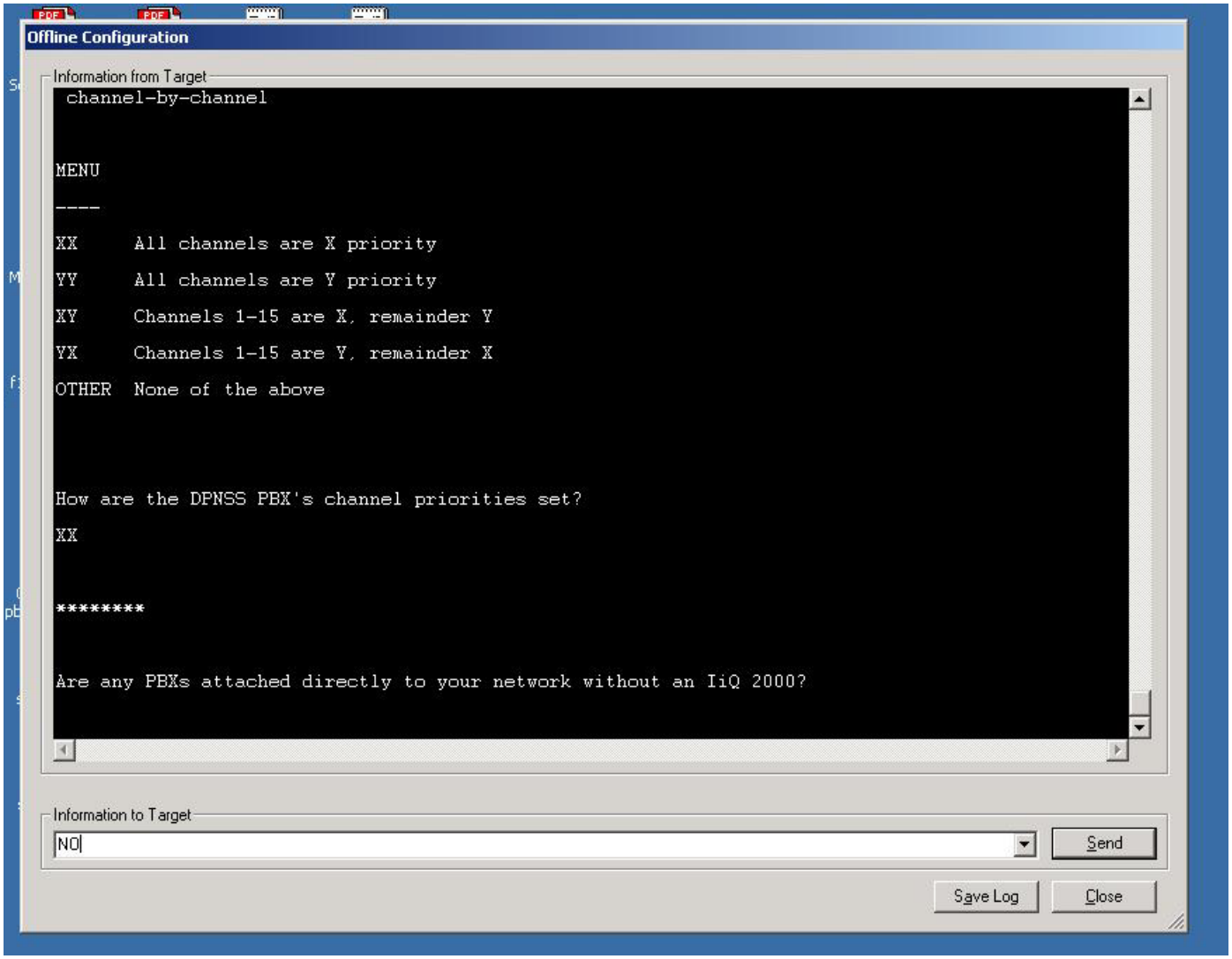


Figure 36. Transparent DPNSS signaling: Select YES.

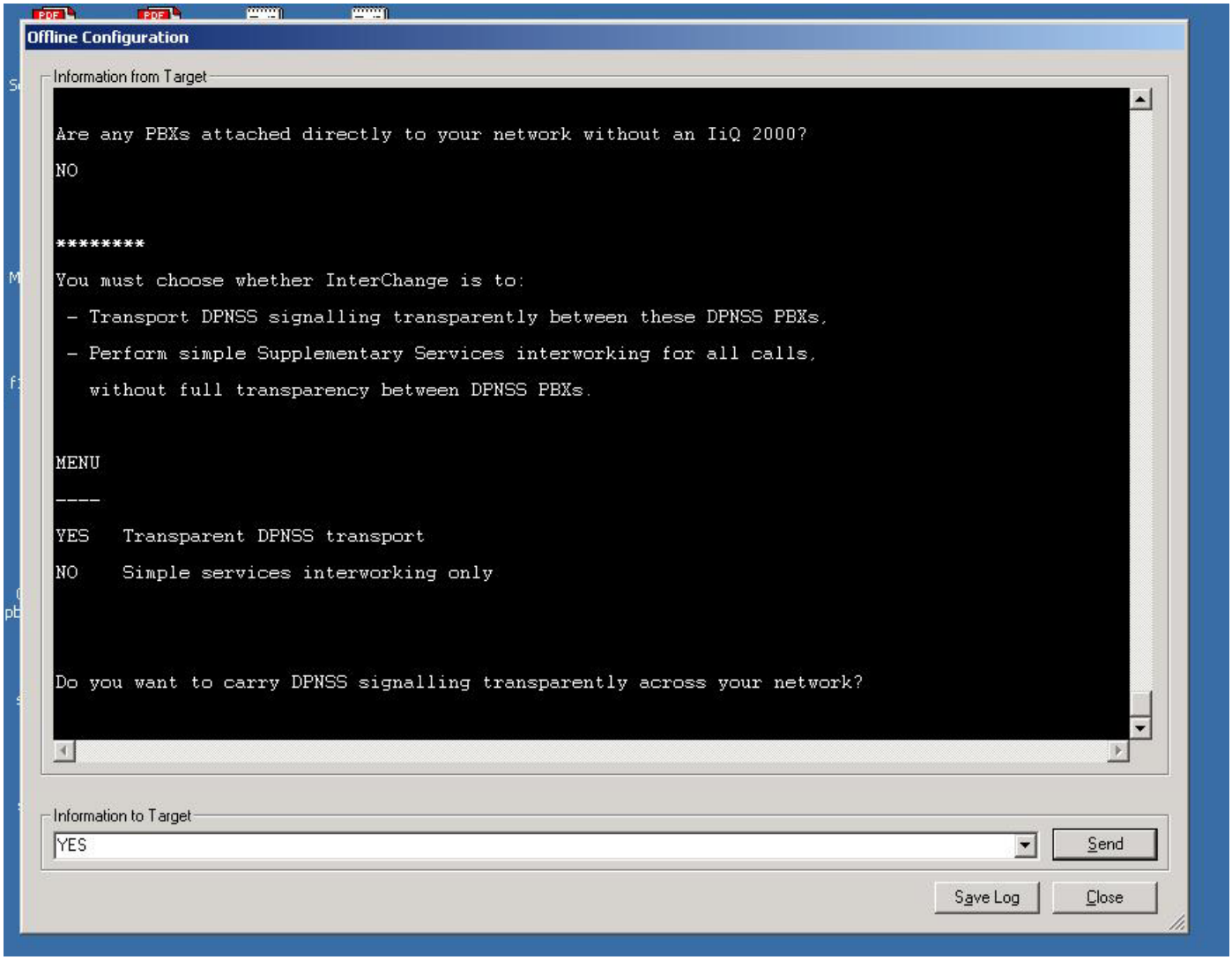


Figure 37. Confirm application: Select YES.

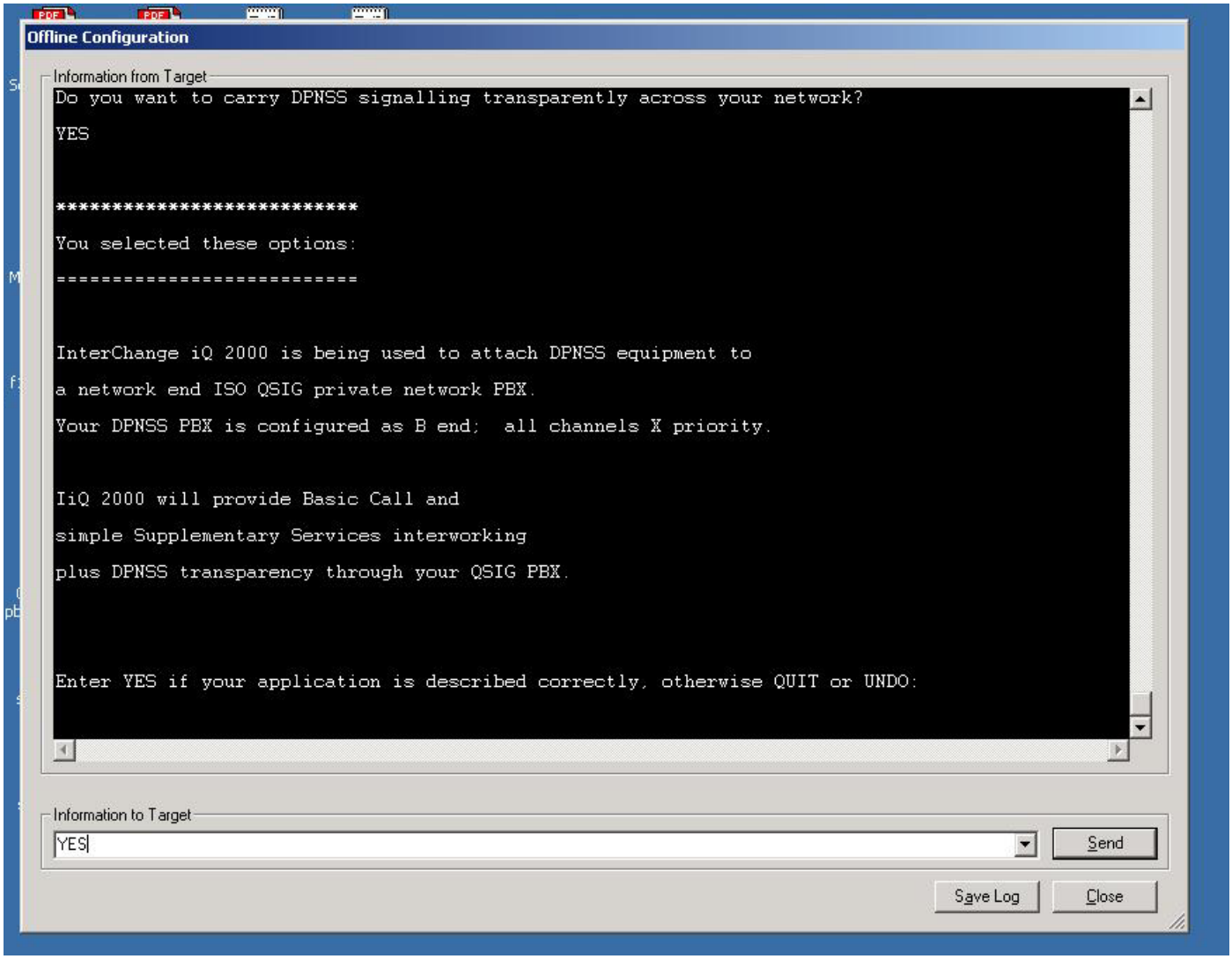


Figure 38. Confirm settings: Select CONF.

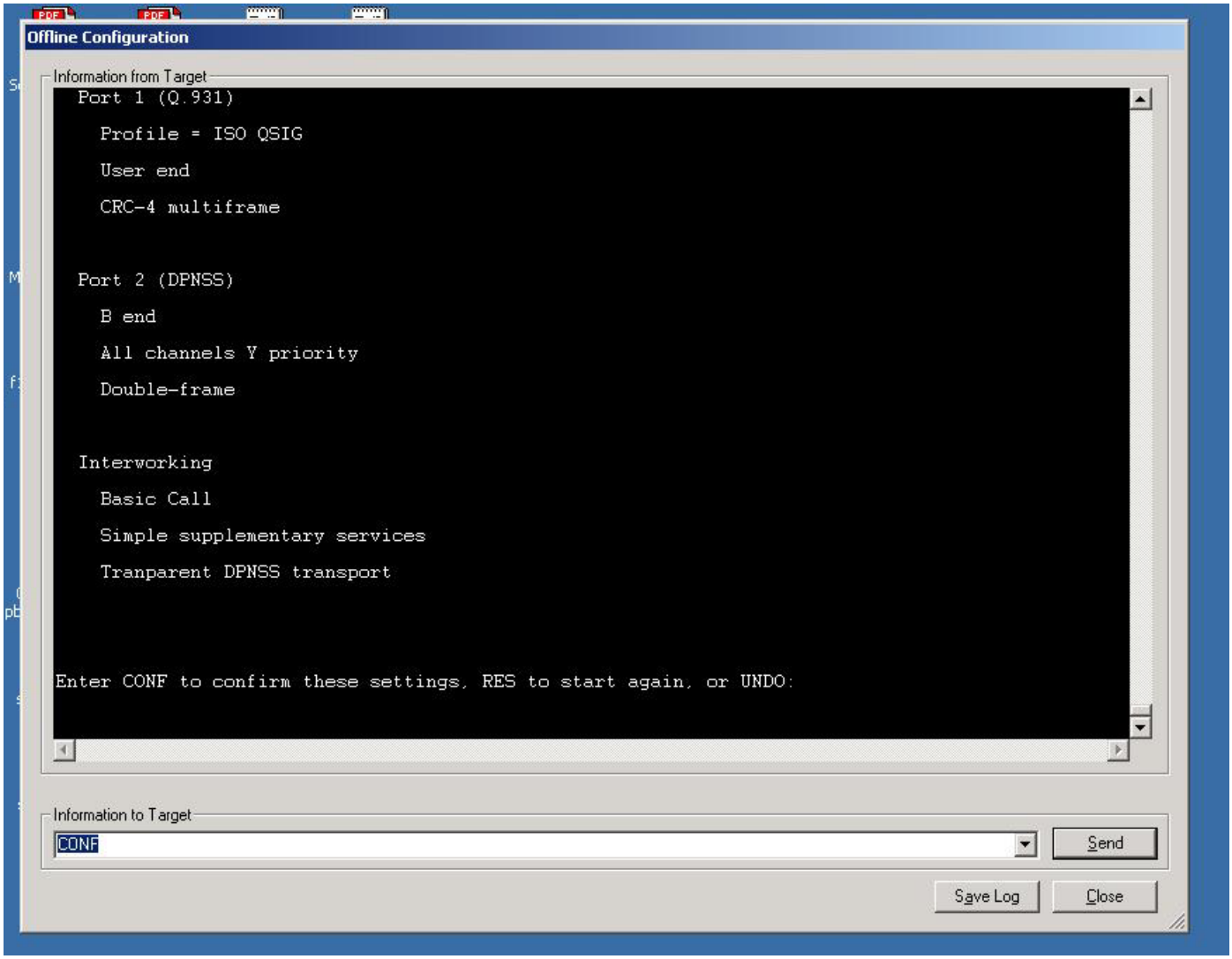


Figure 39. Exiting Configuration: Select EXIT.

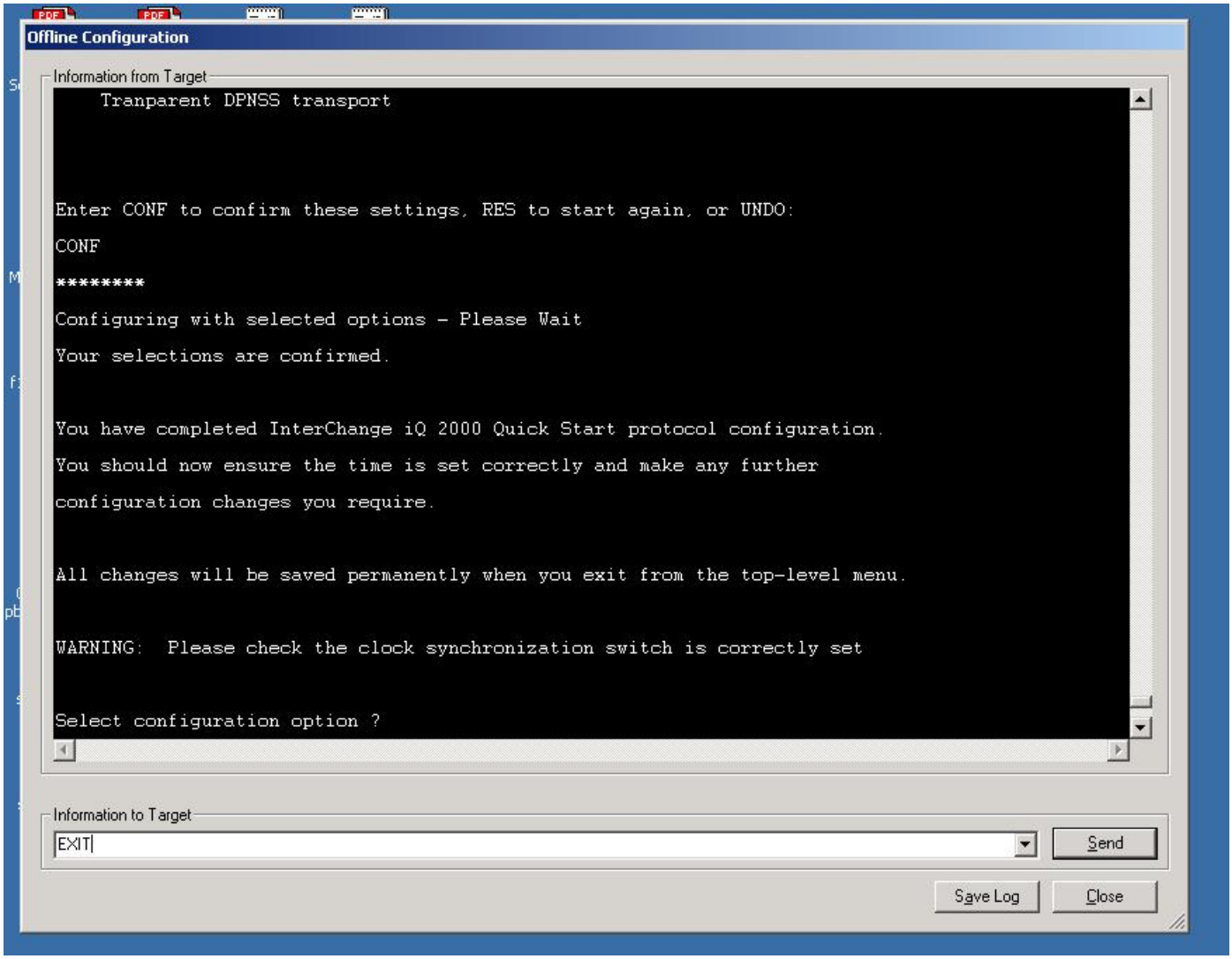
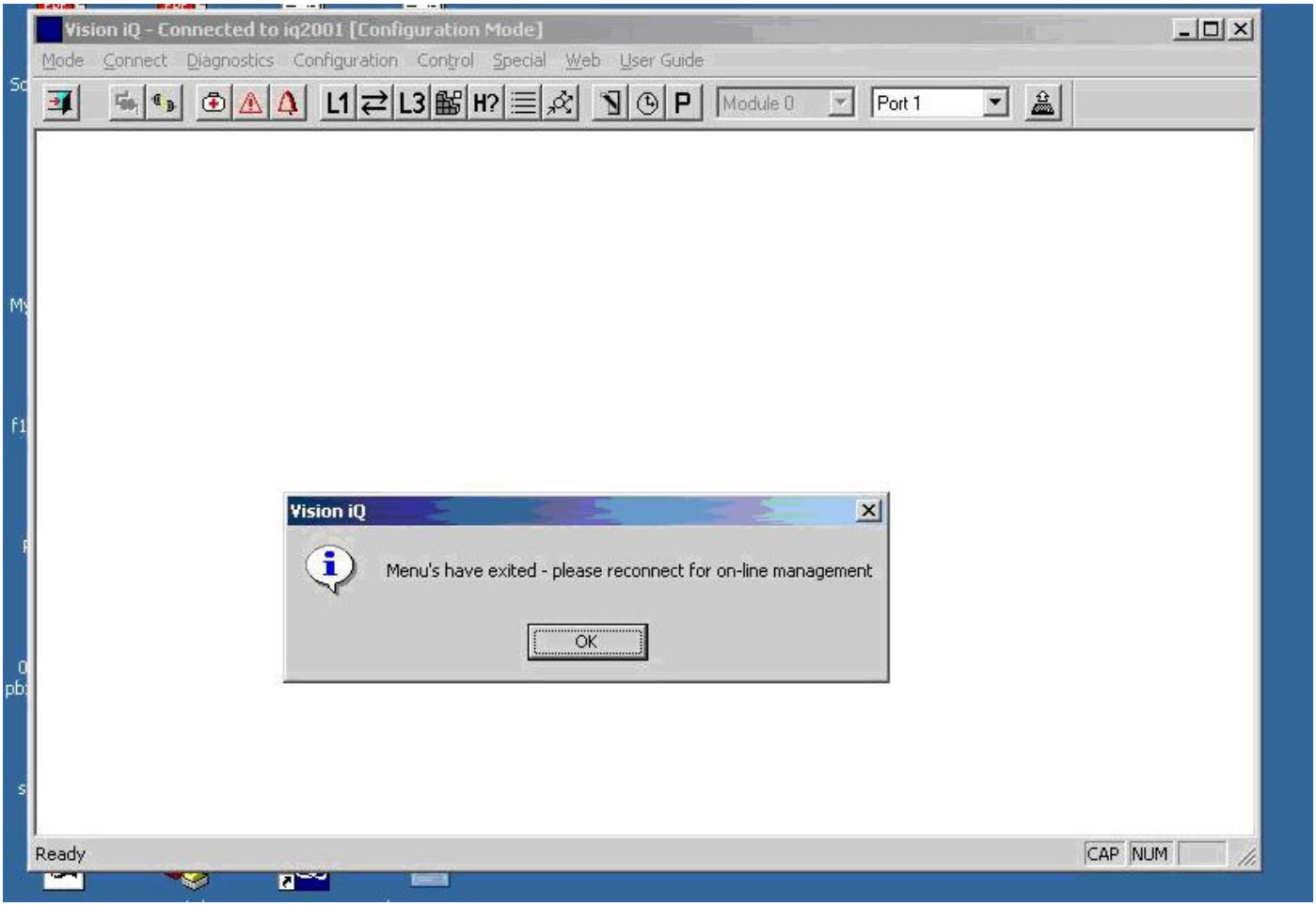


Figure 40. Vision iQ screen after exiting command line configuration screens.



Reconnect to the IiQ2000 and select Monitor Mode. Check the settings.

Figure 41. iQ Diagnostics: Select Module 0.

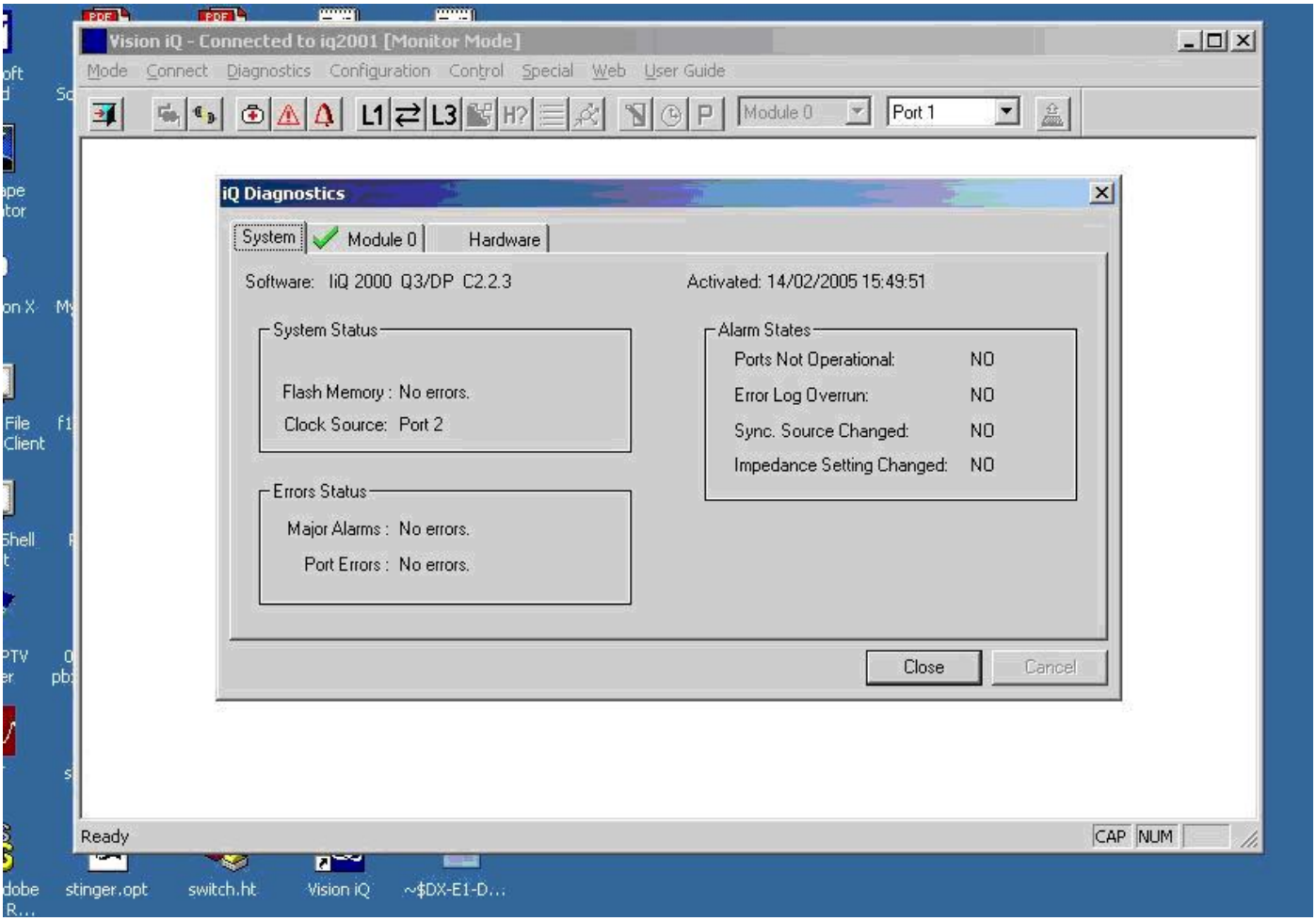


Figure 42. iQ Diagnostics: Check the Link Status.

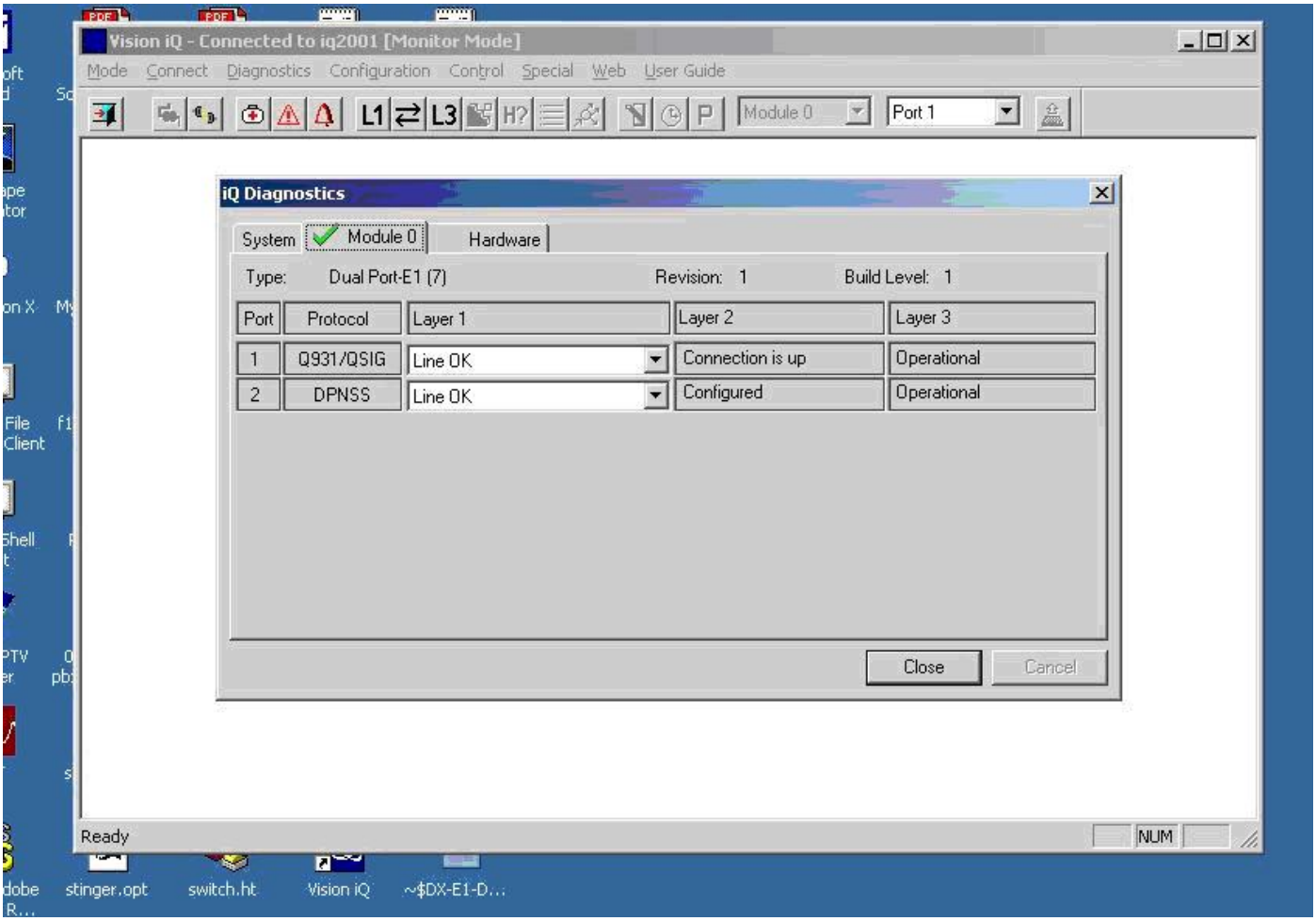


Figure 43. Entering the IiQ2000 configuration

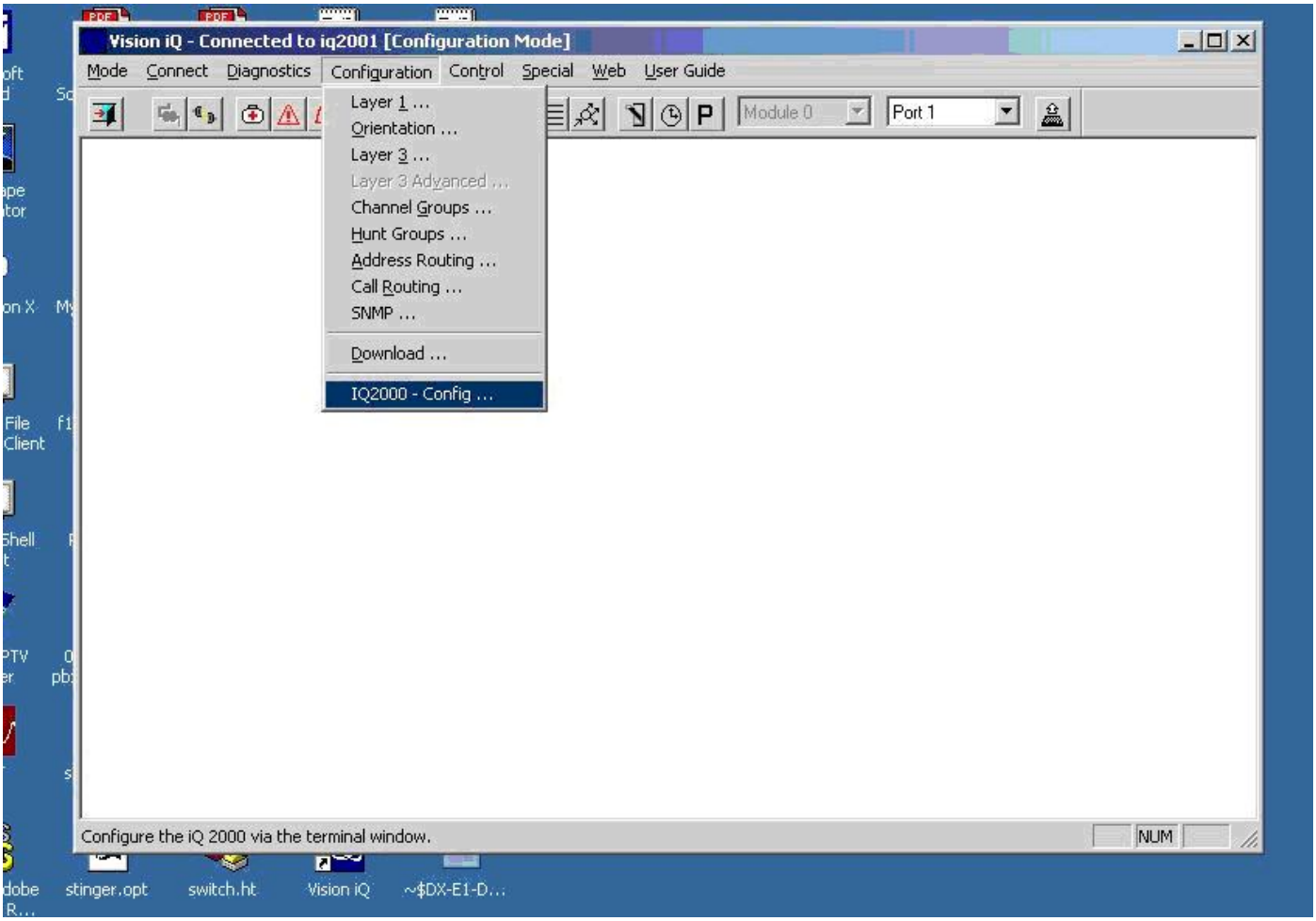


Figure 44. Configuration Warning: Click “yes”.

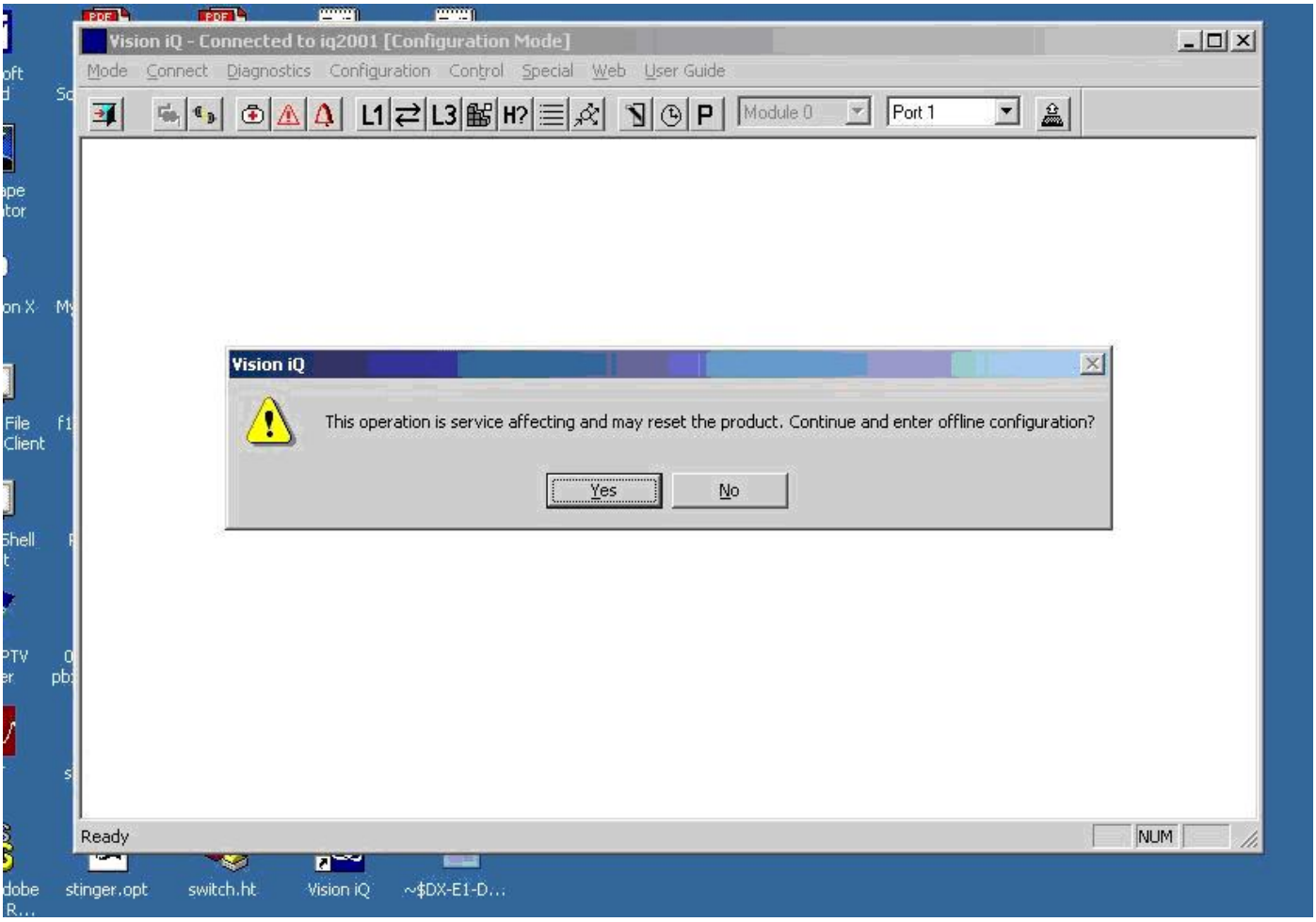


Figure 45. IiQ2000 Configuration Command Line Interface: Hit RETURN.

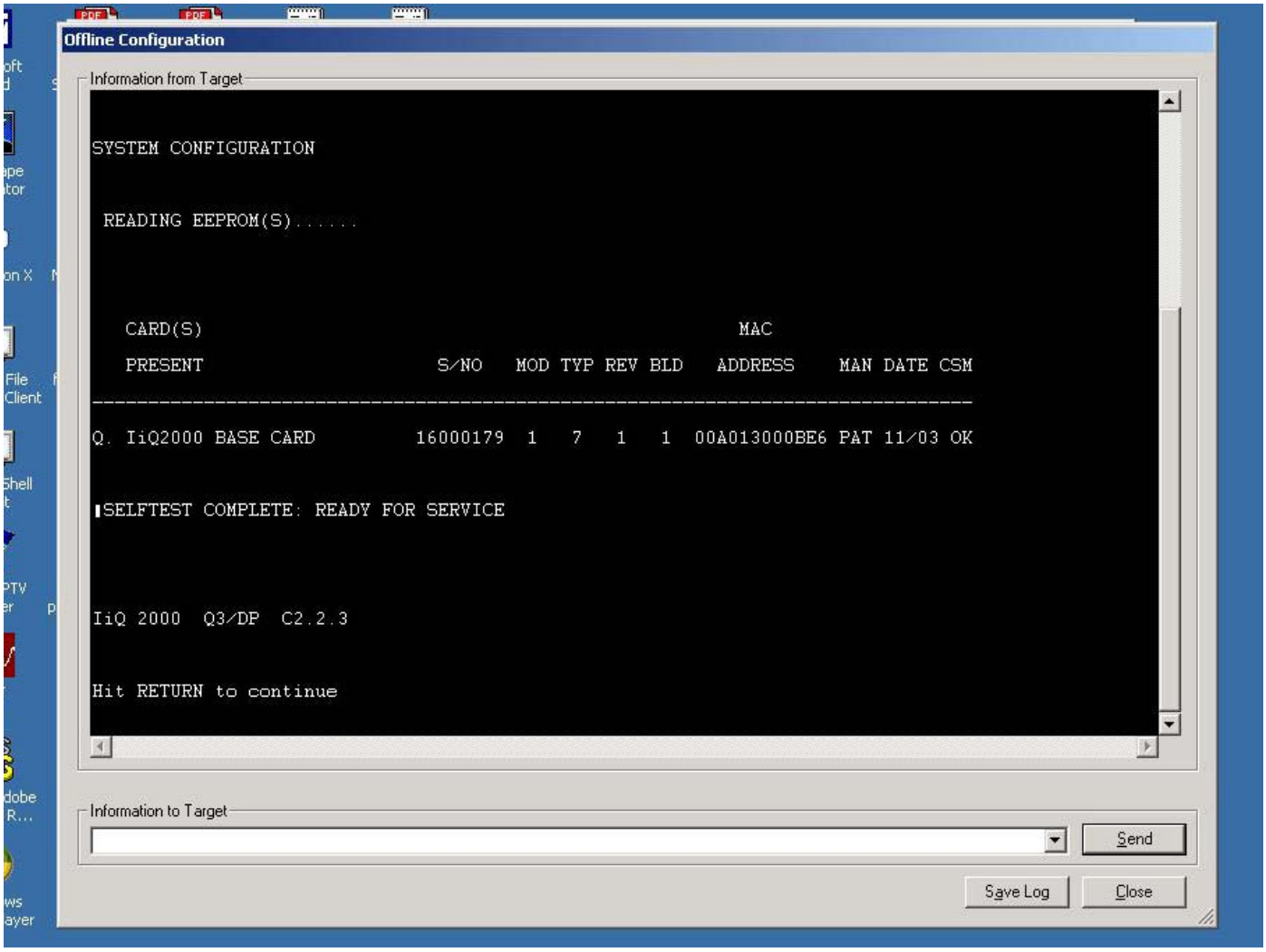


Figure 46. Selecting configuration option: Select ADV.

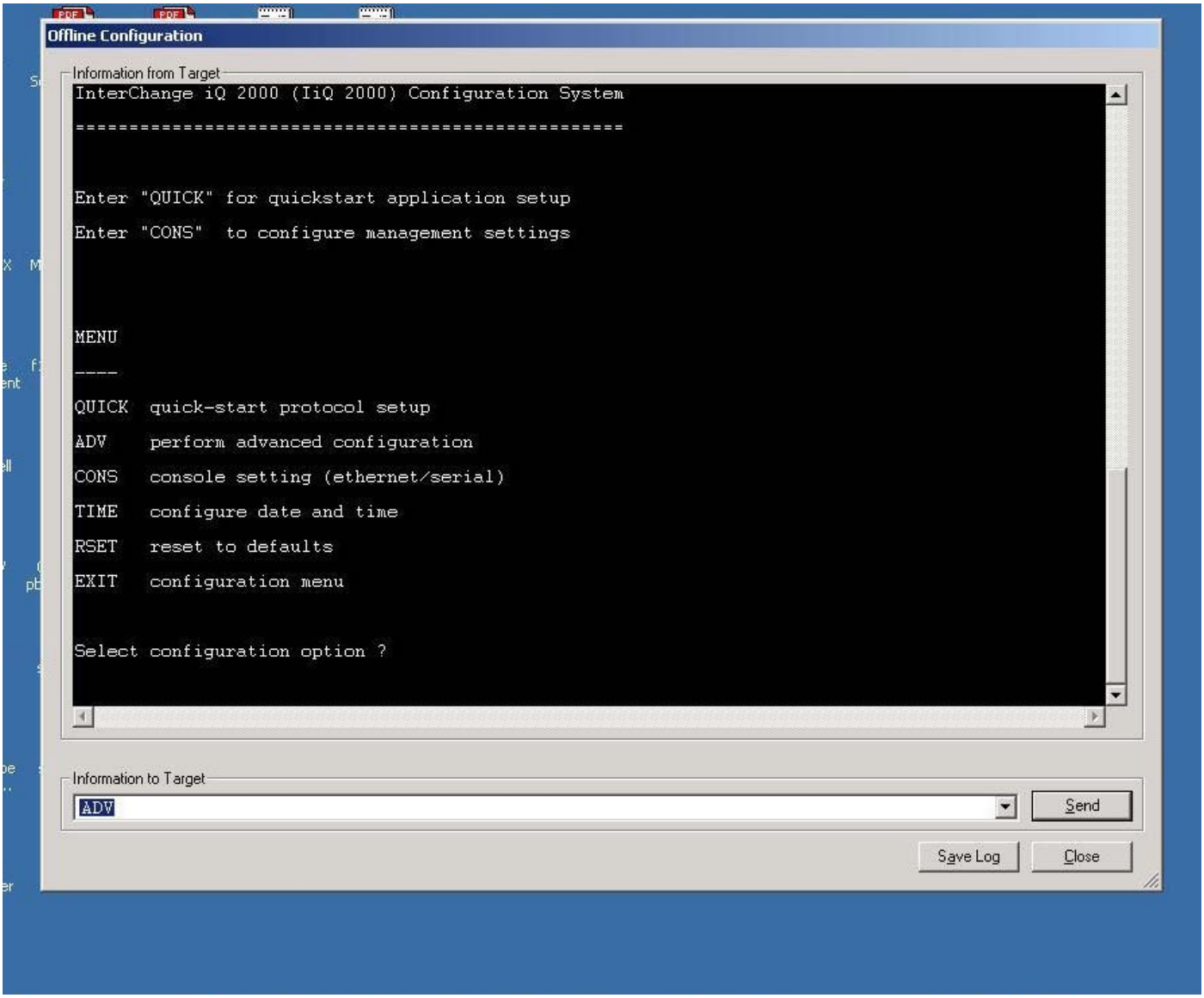


Figure 47. Advanced Configuration Menu: Select IWRK.

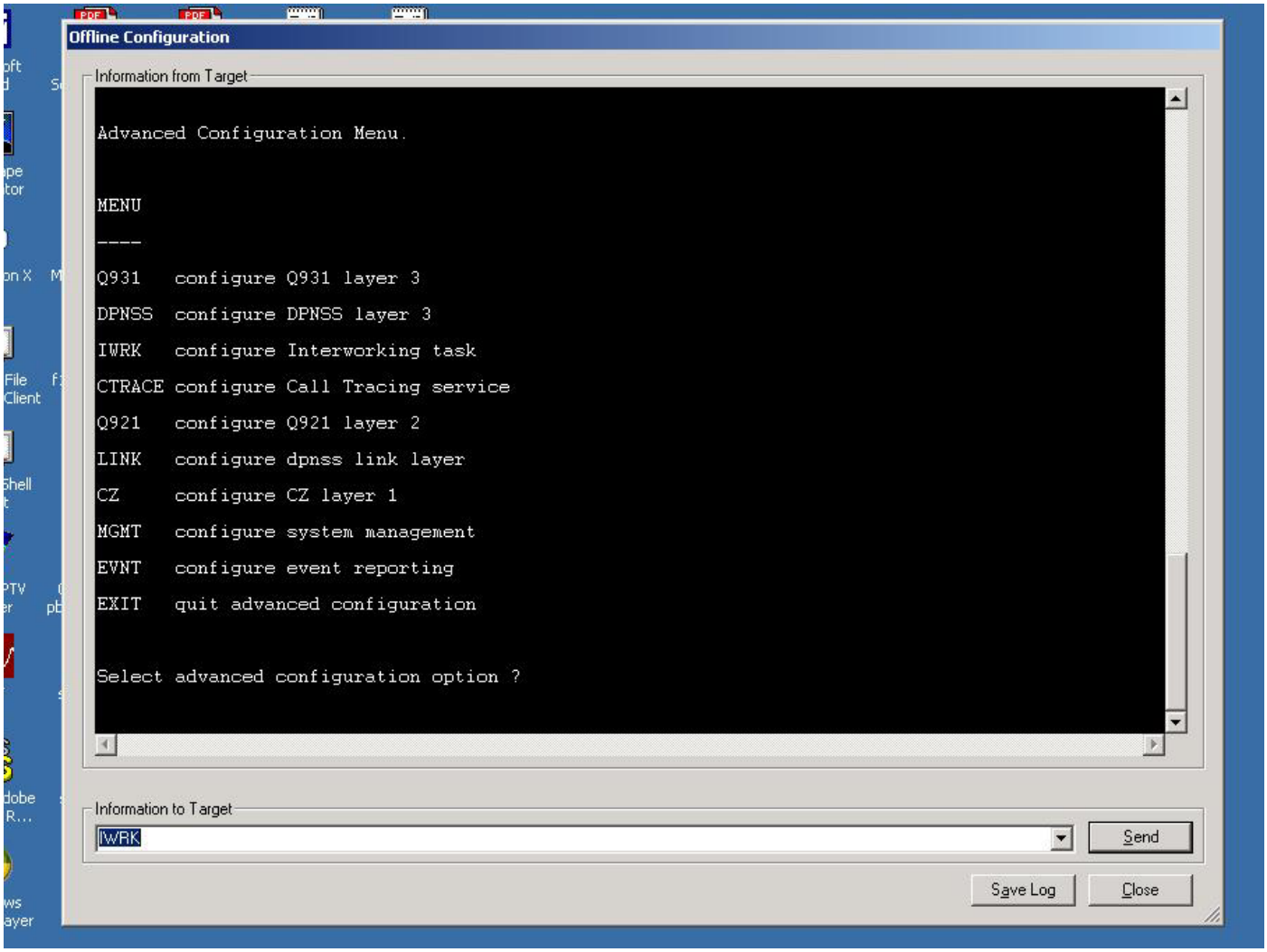


Figure 48. Interworking Parameters. Enter "?" for choices.

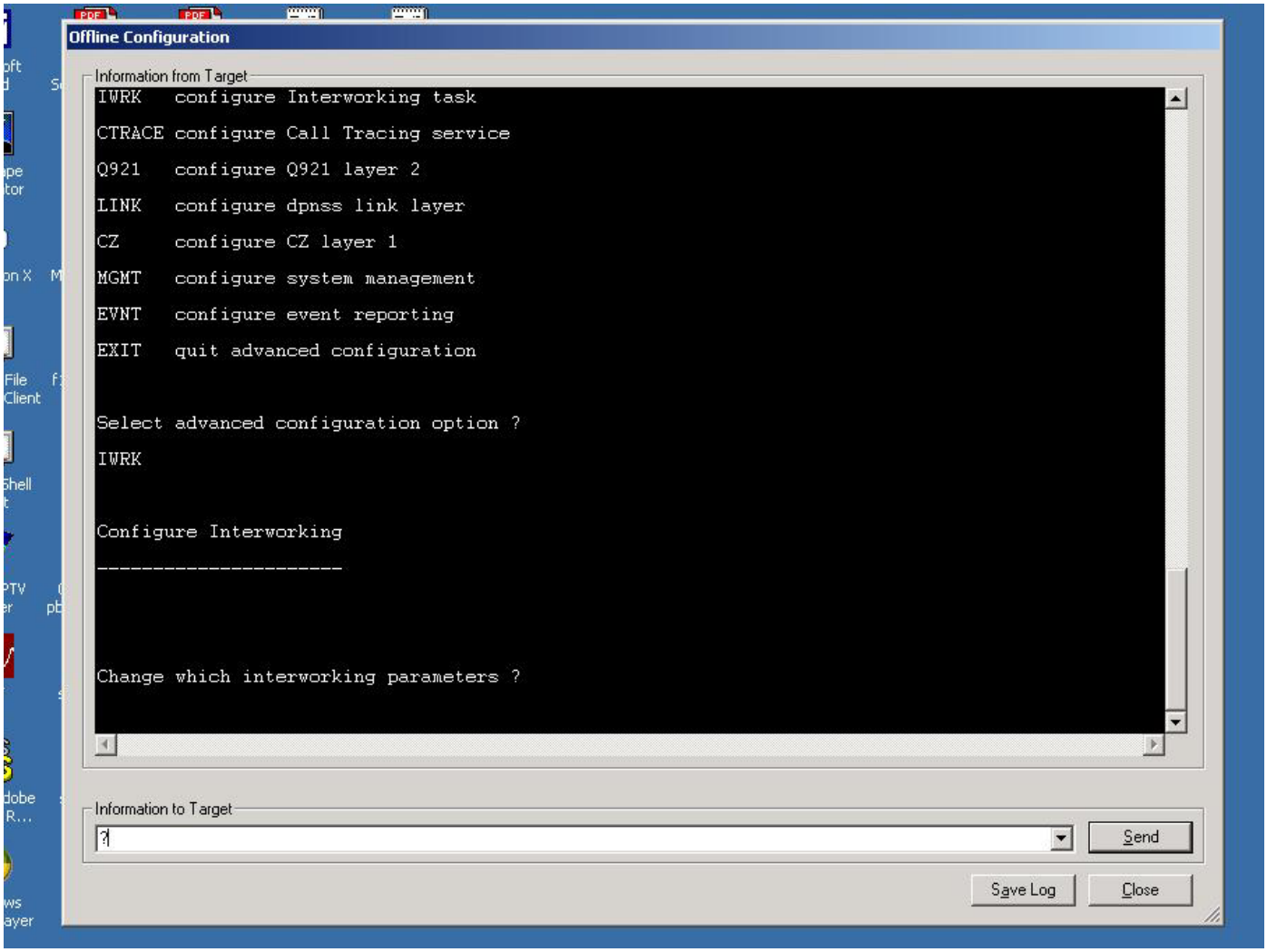


Figure 49. Interworking Parameters Menu: Select NSI.

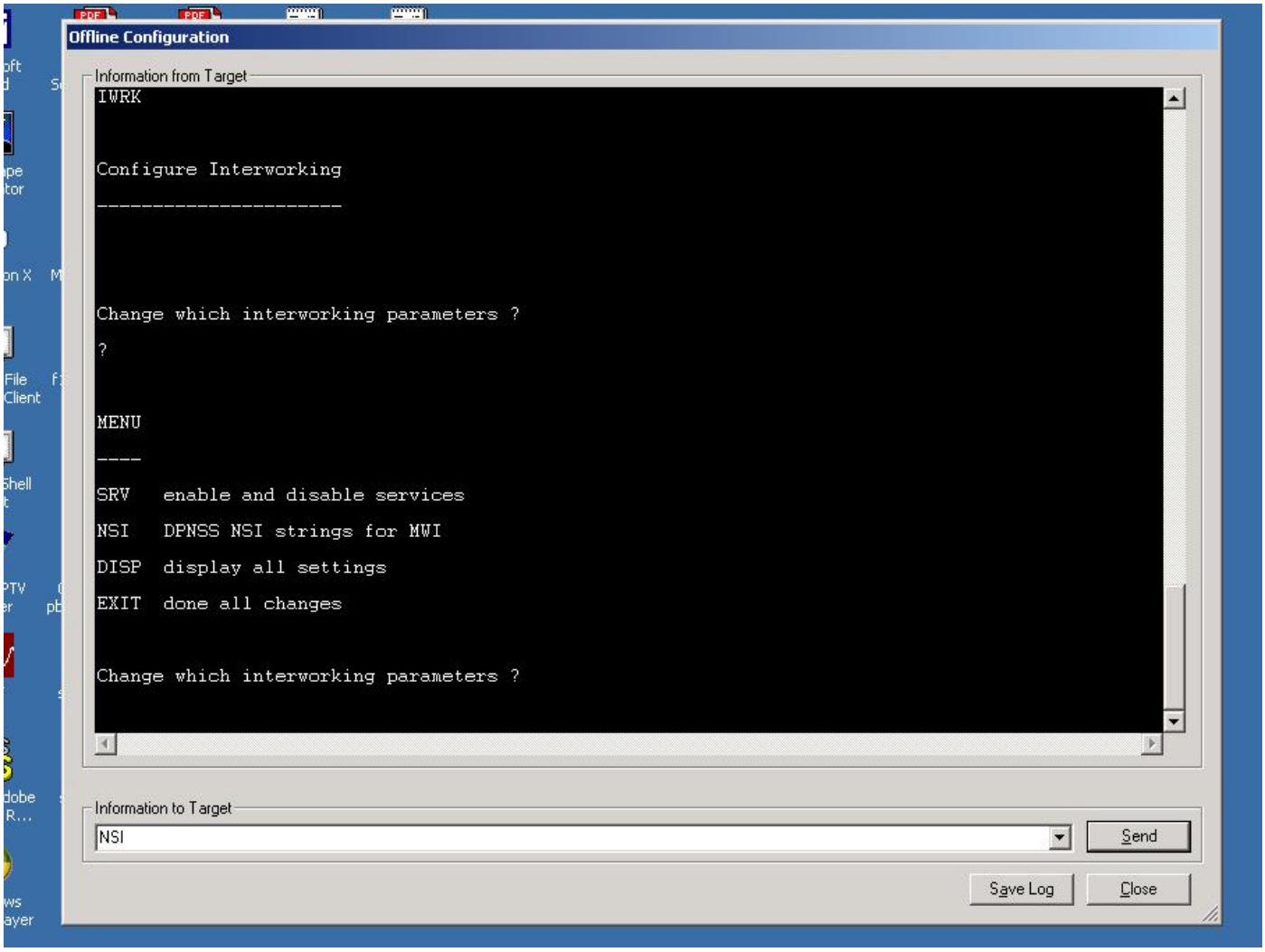


Figure 50. NSI string. Enter "?" for choices.

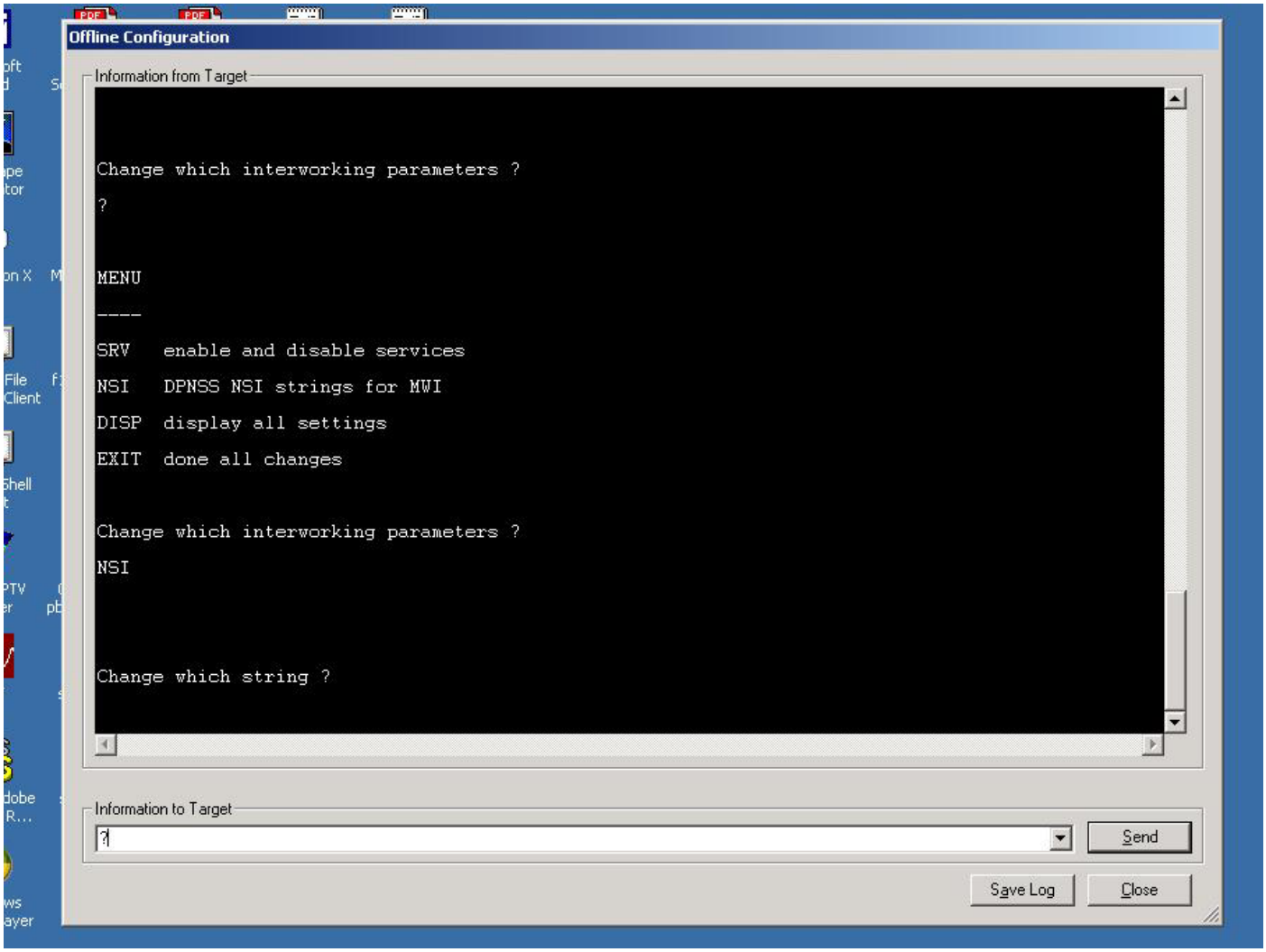


Figure 51. NSI string menu: Select DISP for display.

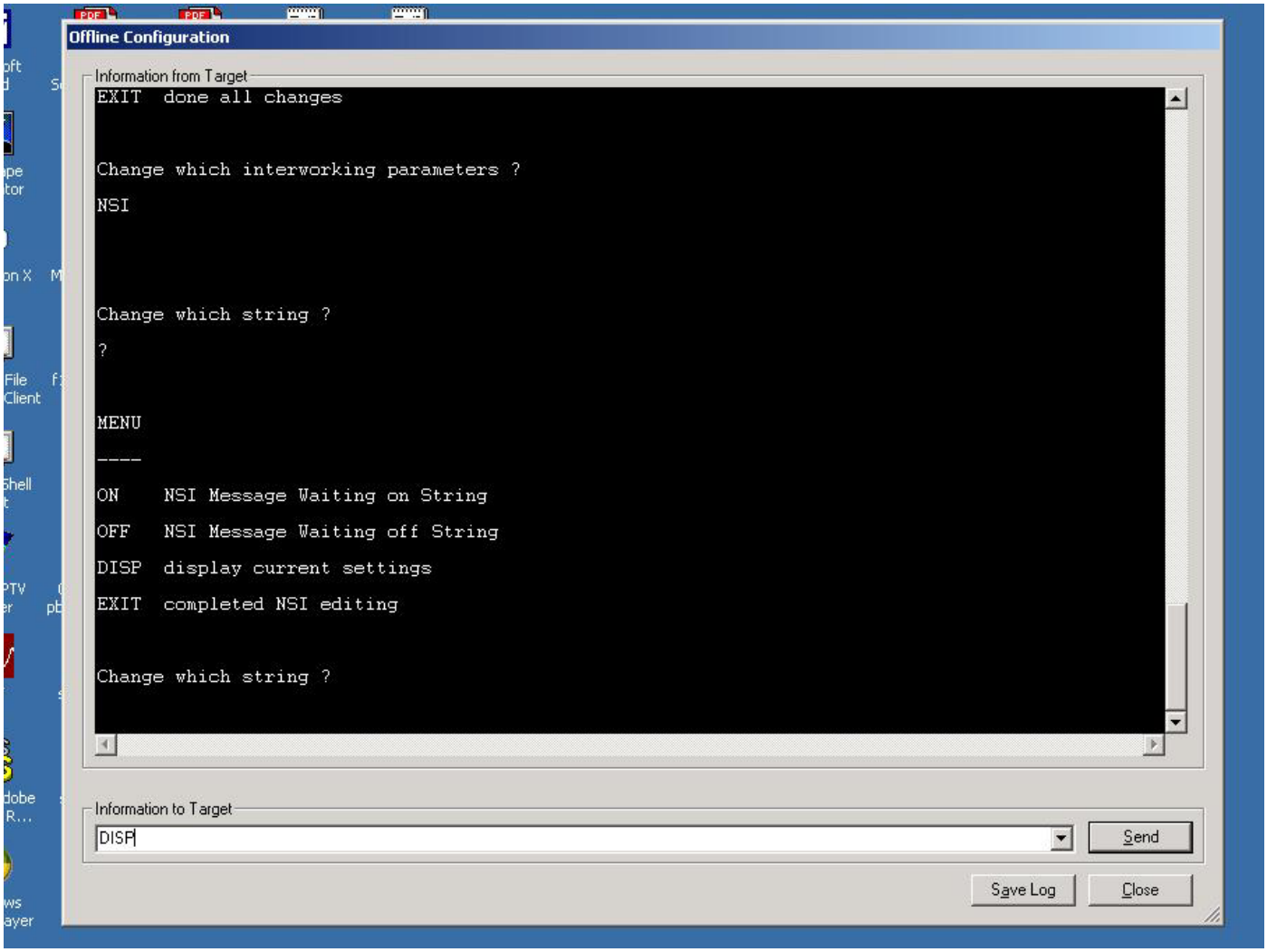


Figure 52. Sample NSI string display for DPNSS MWI ON/OFF: Select ON.

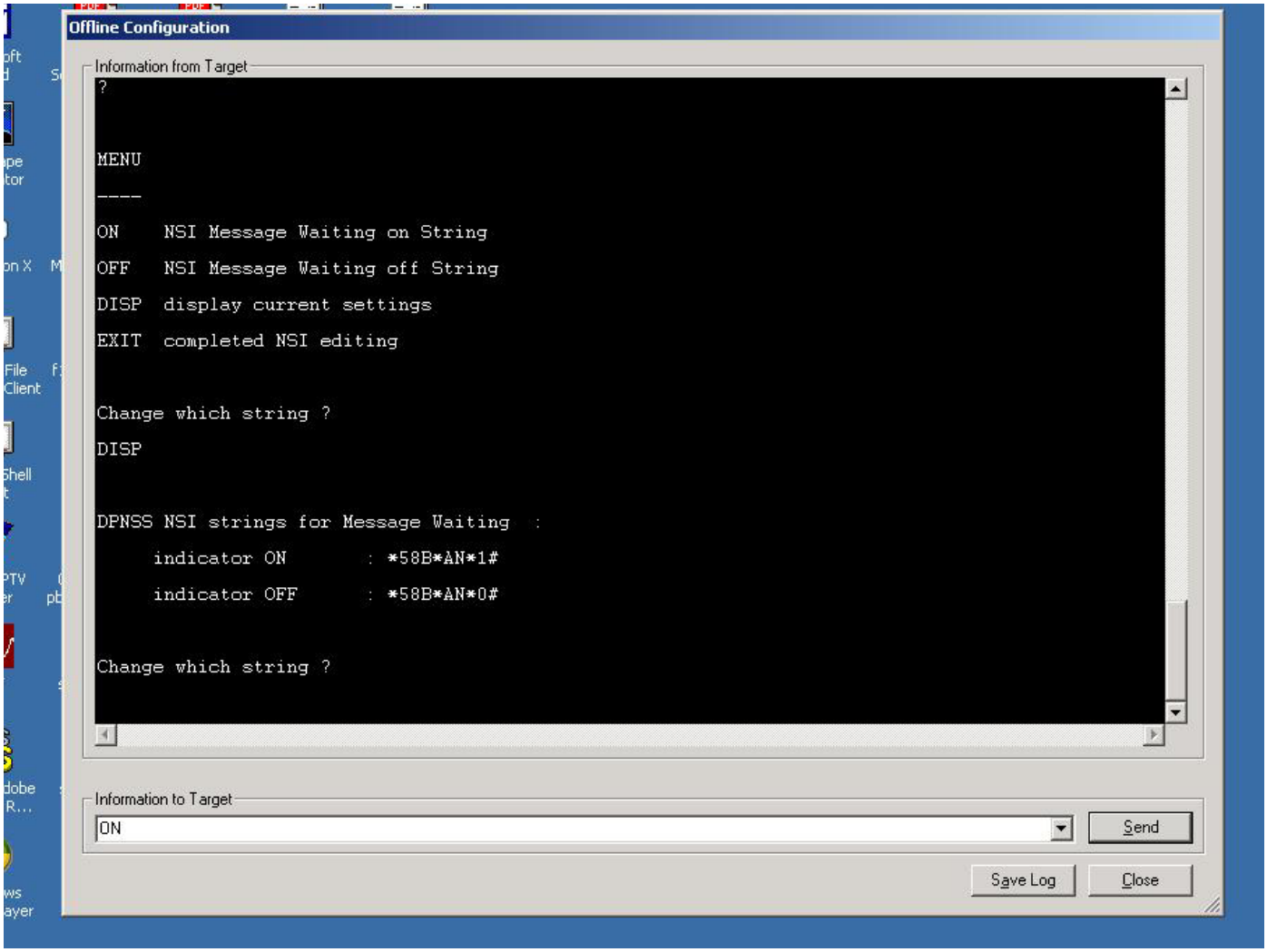


Figure 53. Changing the DPNSS MWI ON string. Enter "?" for choices.

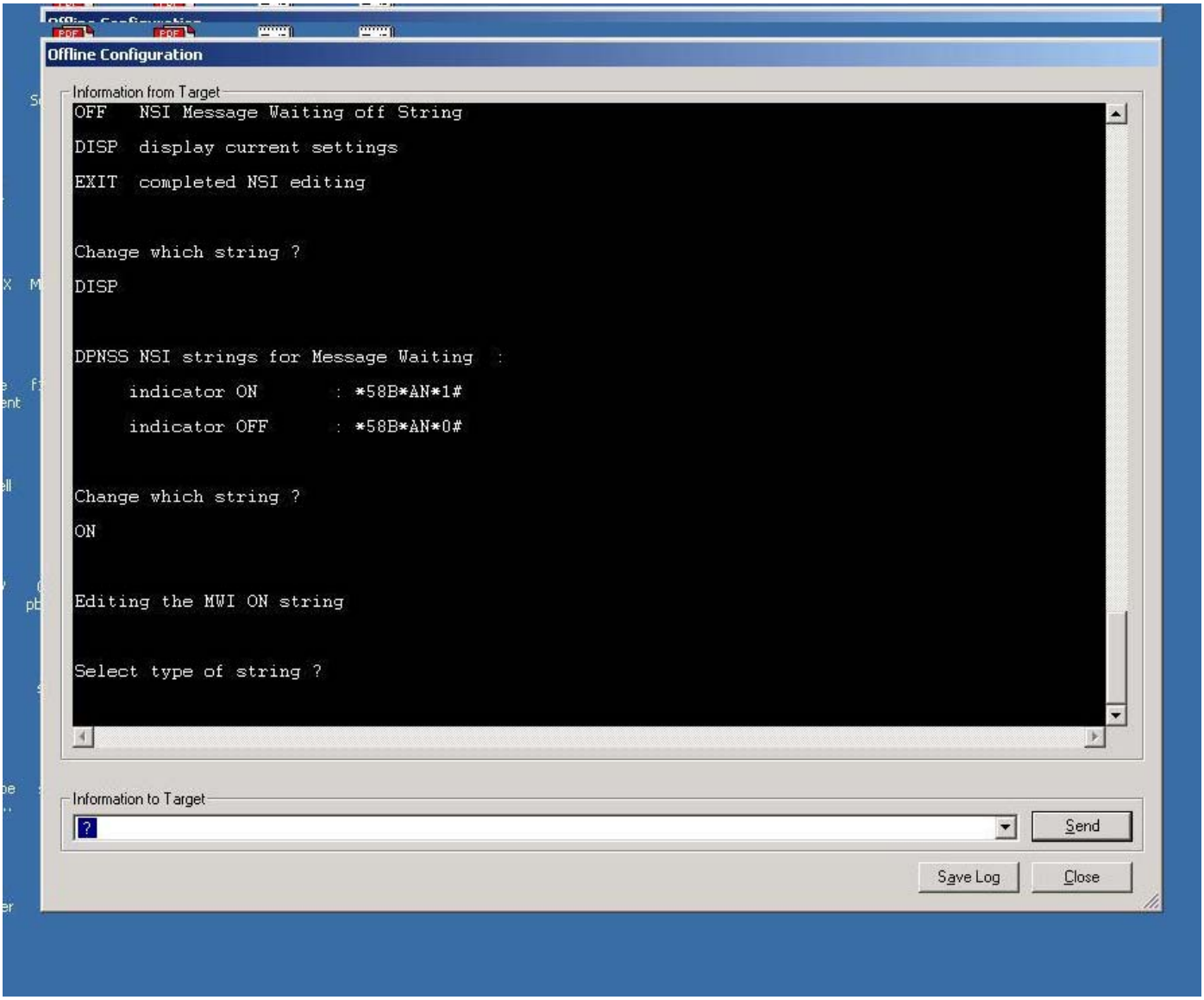


Figure 54. Changing the DPNSS MWI ON string: Select MD110.

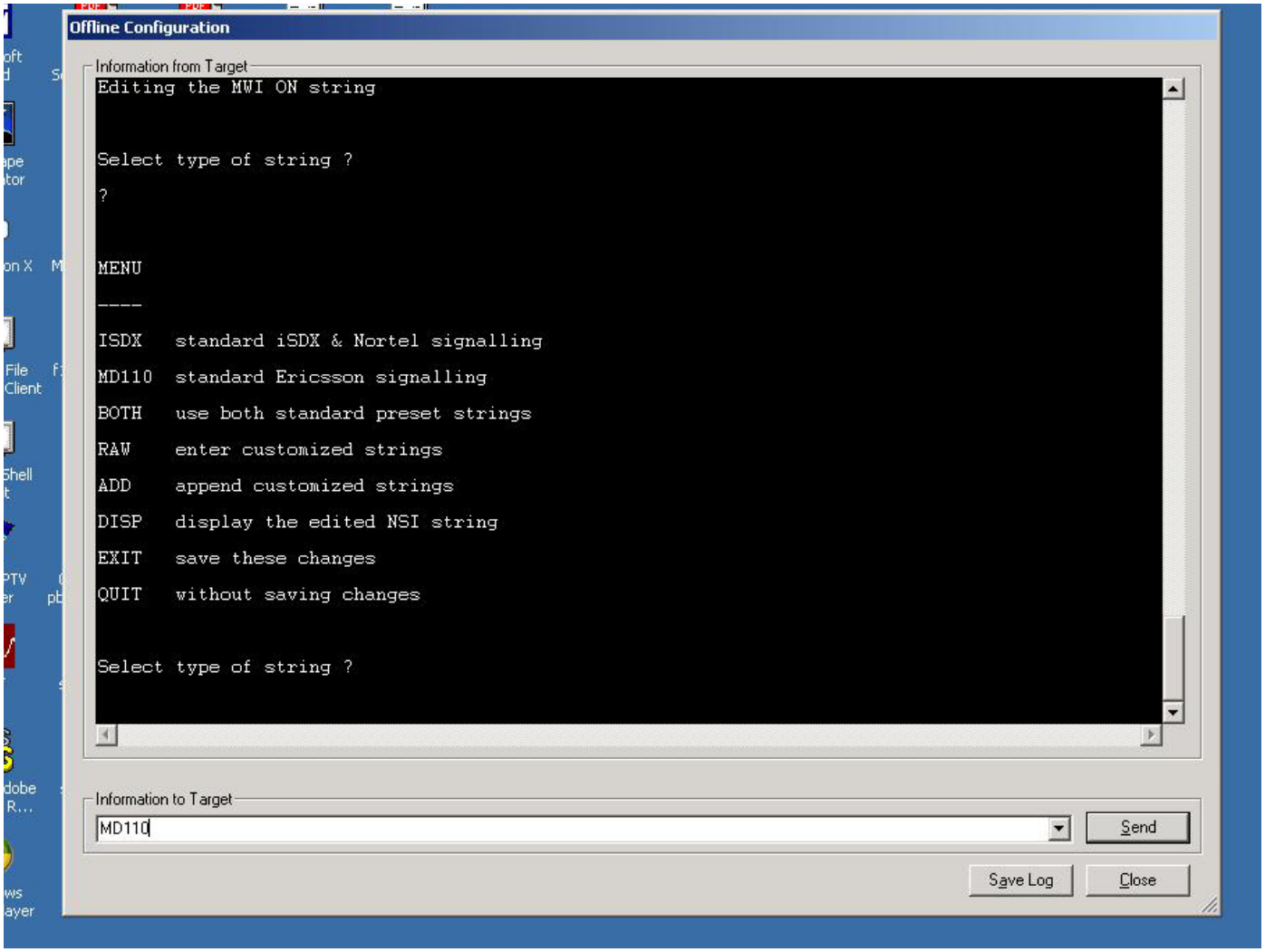


Figure 55. Changing the DPNSS MWI ON string: Select NO call center number.

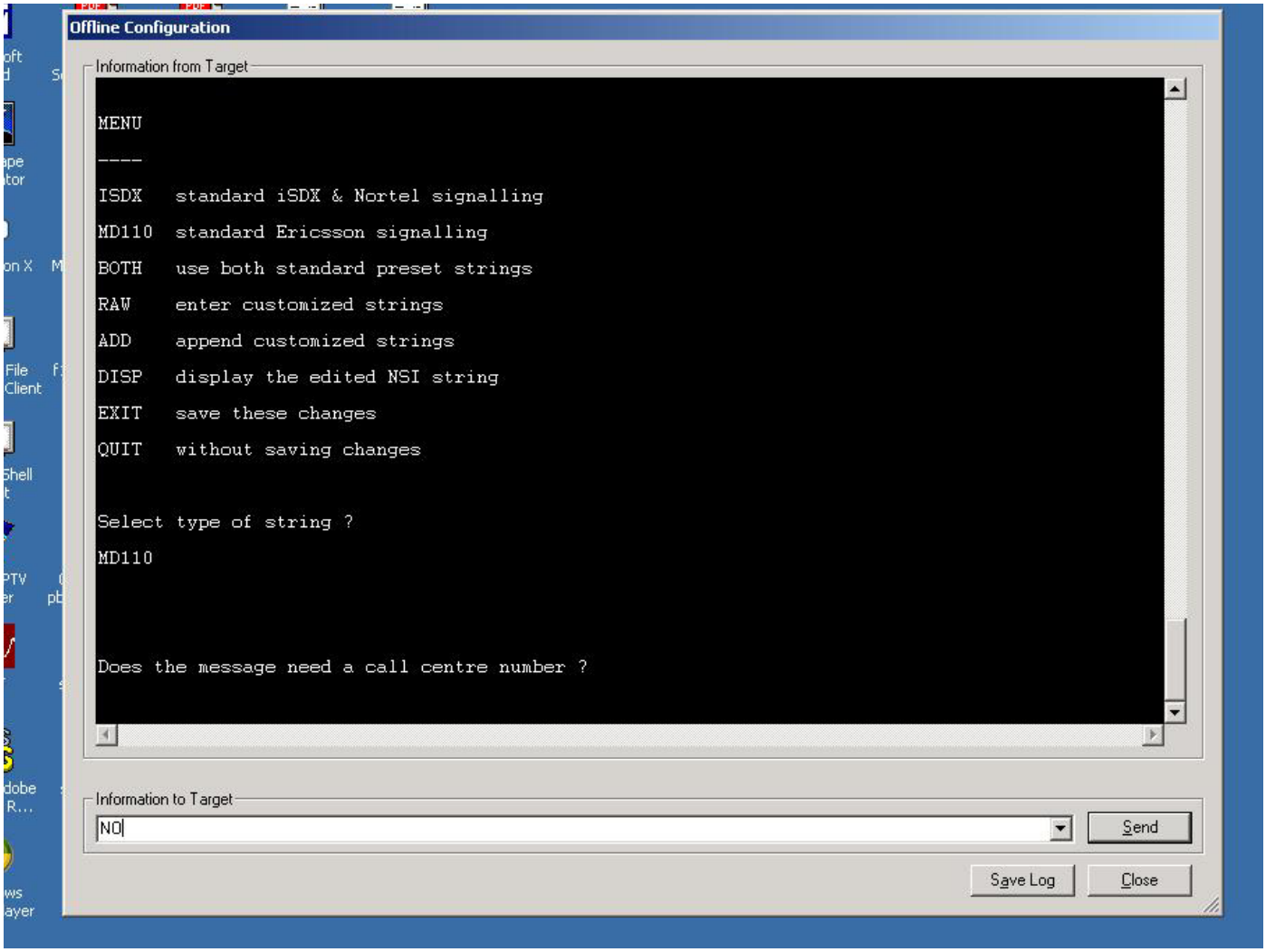


Figure 56. Changing the DPNSS MWI ON string: Select EXIT from submenu.

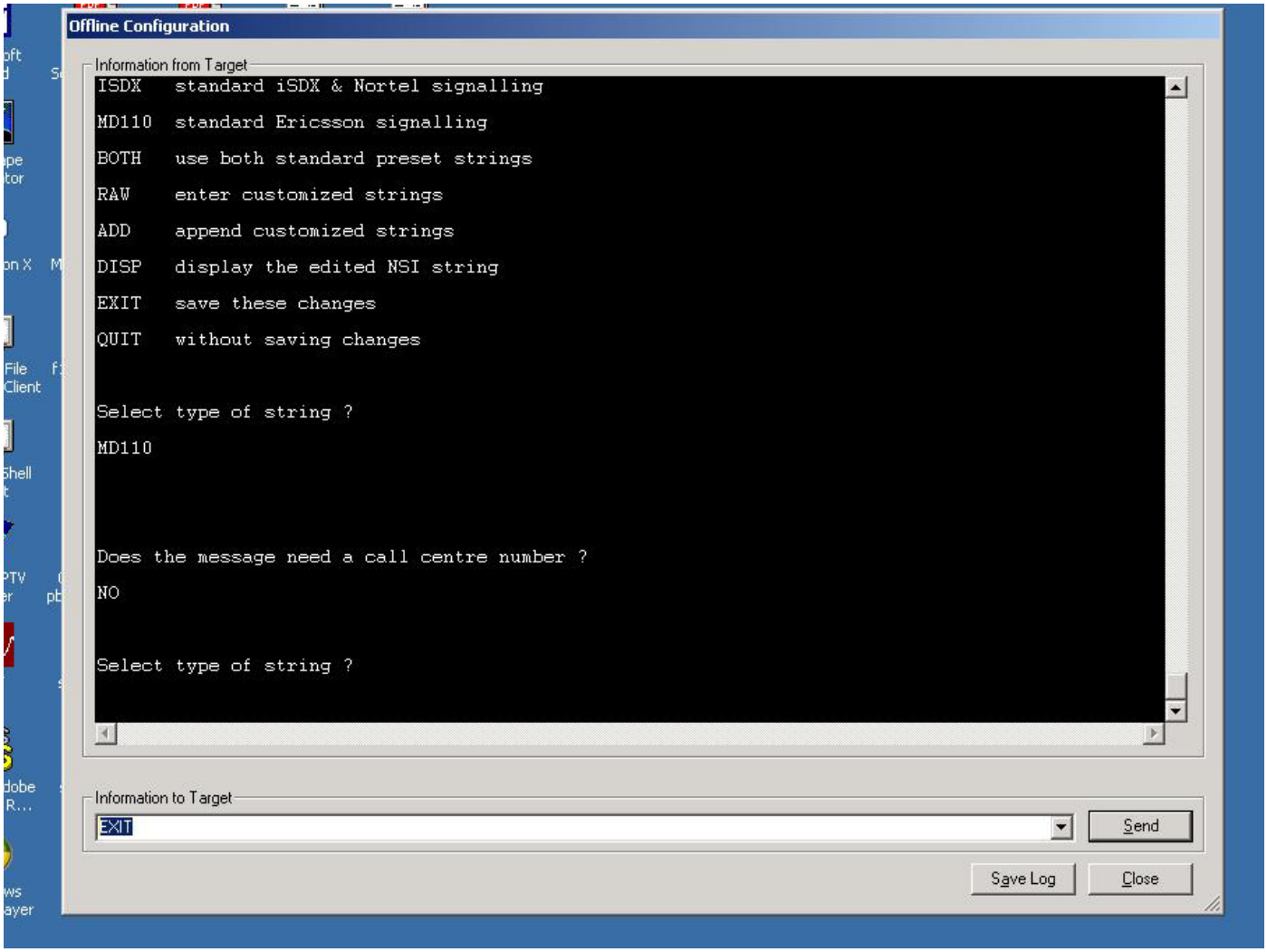


Figure 57. NSI string display for DPNSS MWI ON/OFF: Select OFF

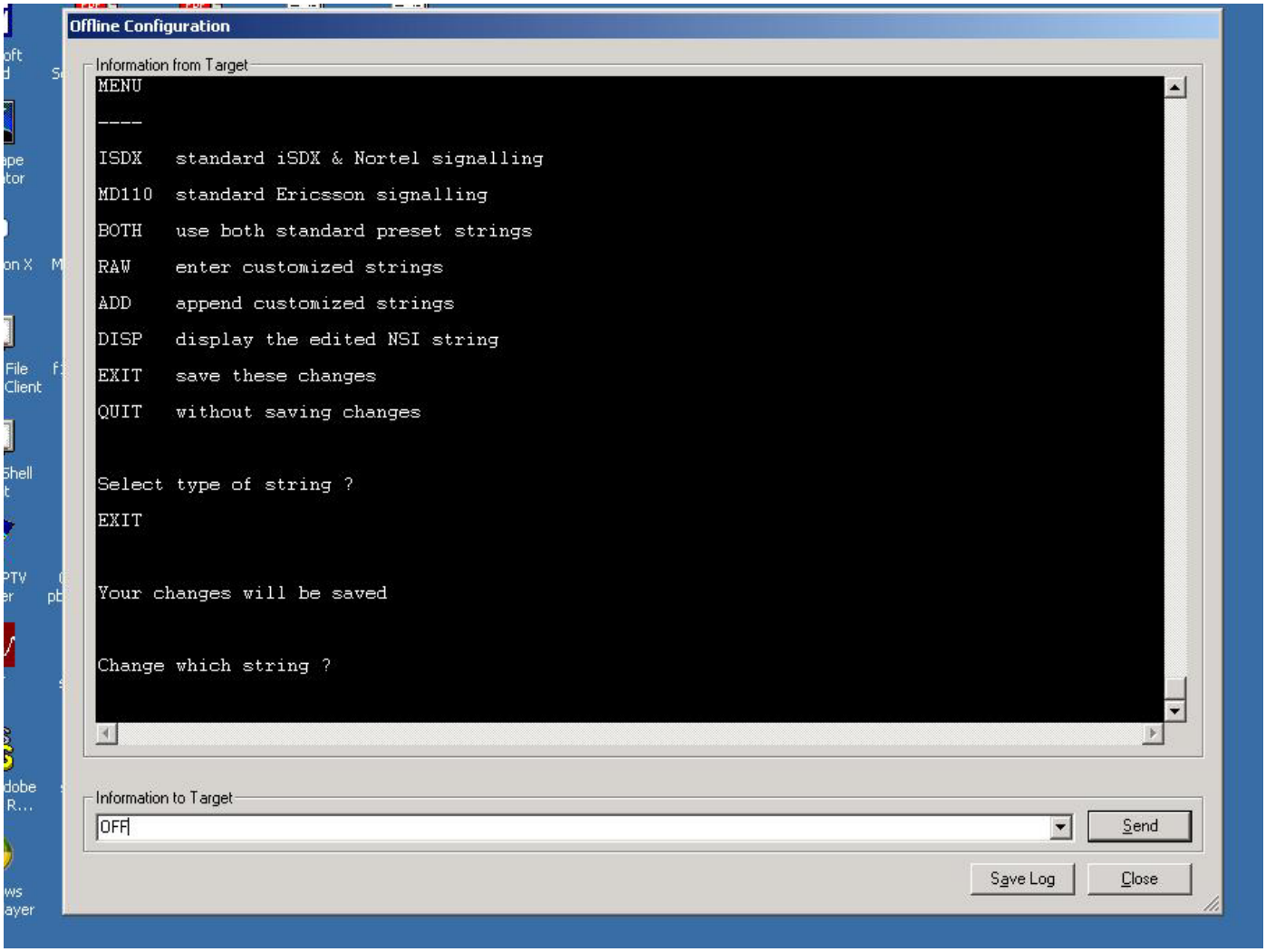


Figure 58. Changing the DPNSS MWI OFF string: Select MD110.

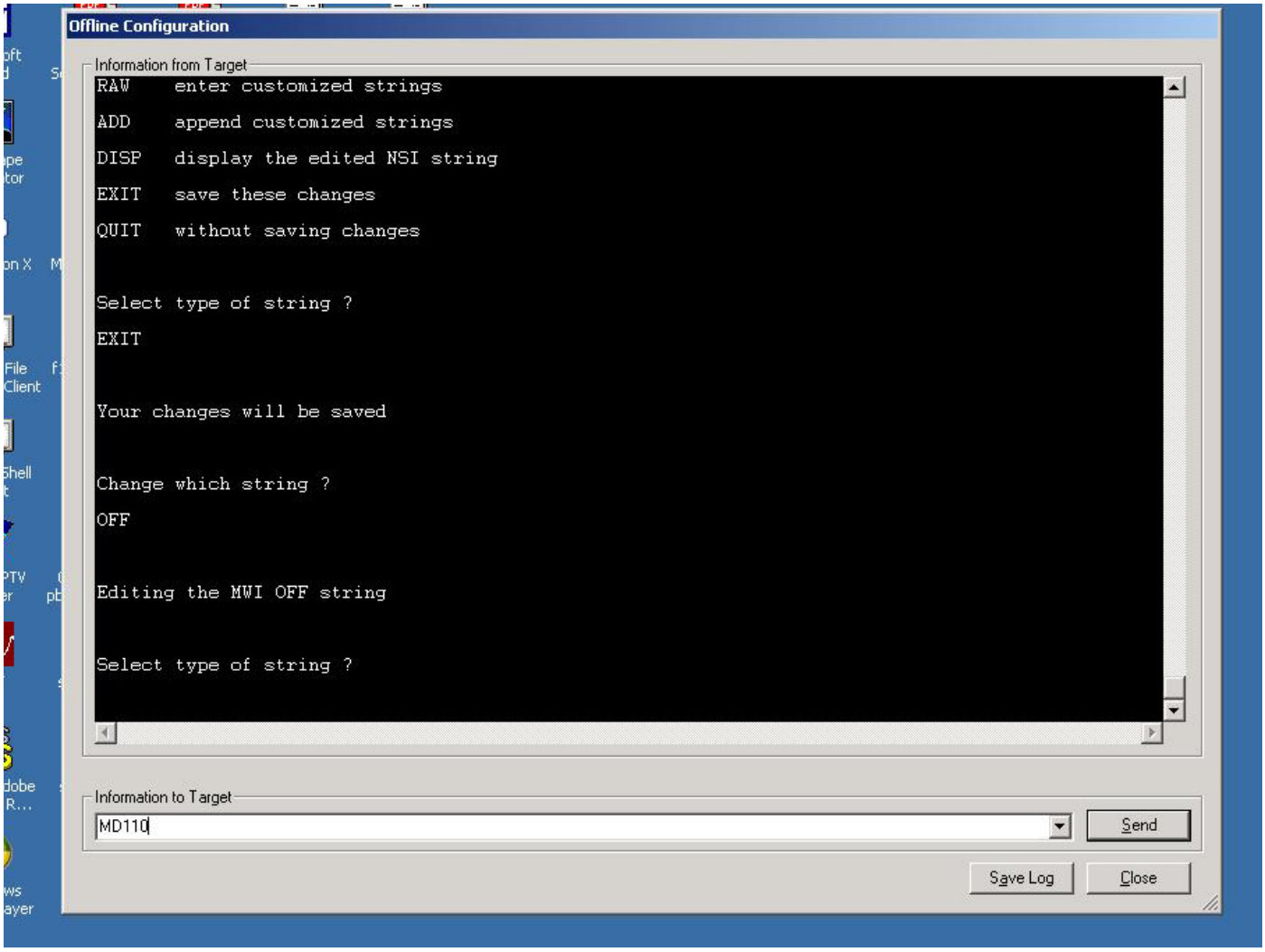


Figure 59. Changing the DPNSS MWI OFF string: Select NO call center number.

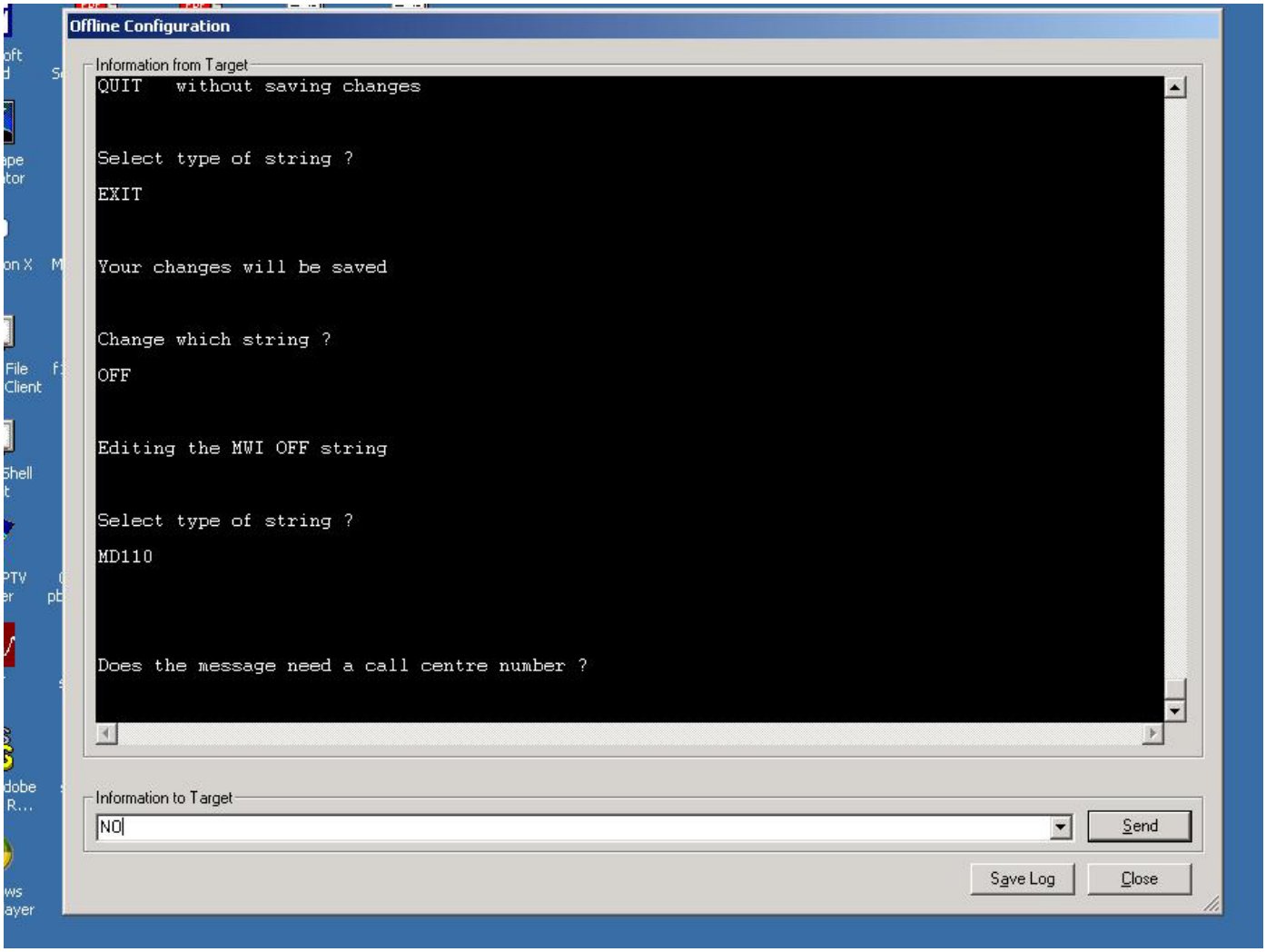


Figure 60. Changing the DPNSS MWI ON string: Select EXIT from submenu.

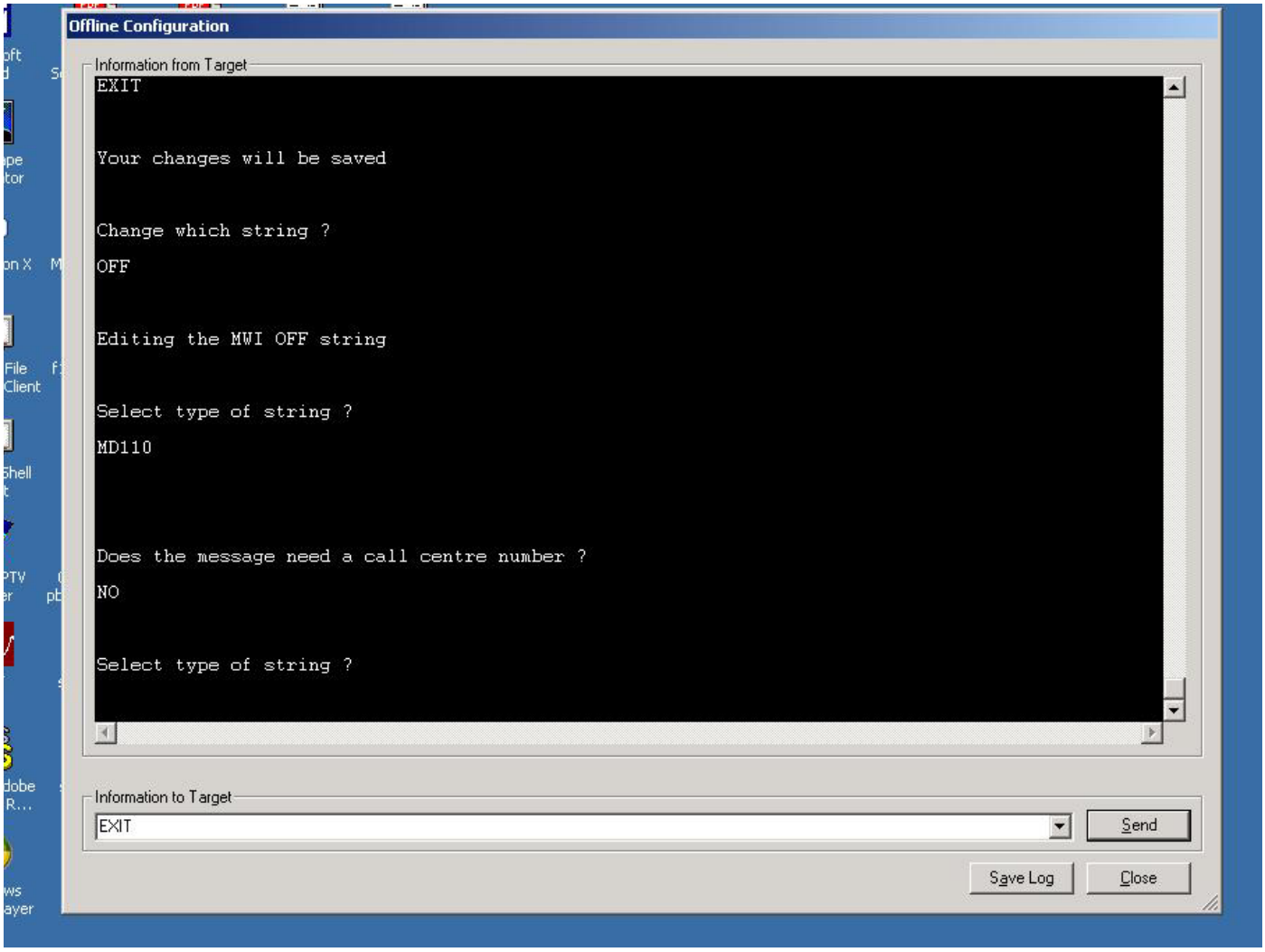


Figure 61. NSI string menu: Select DISP to display new NSI strings.

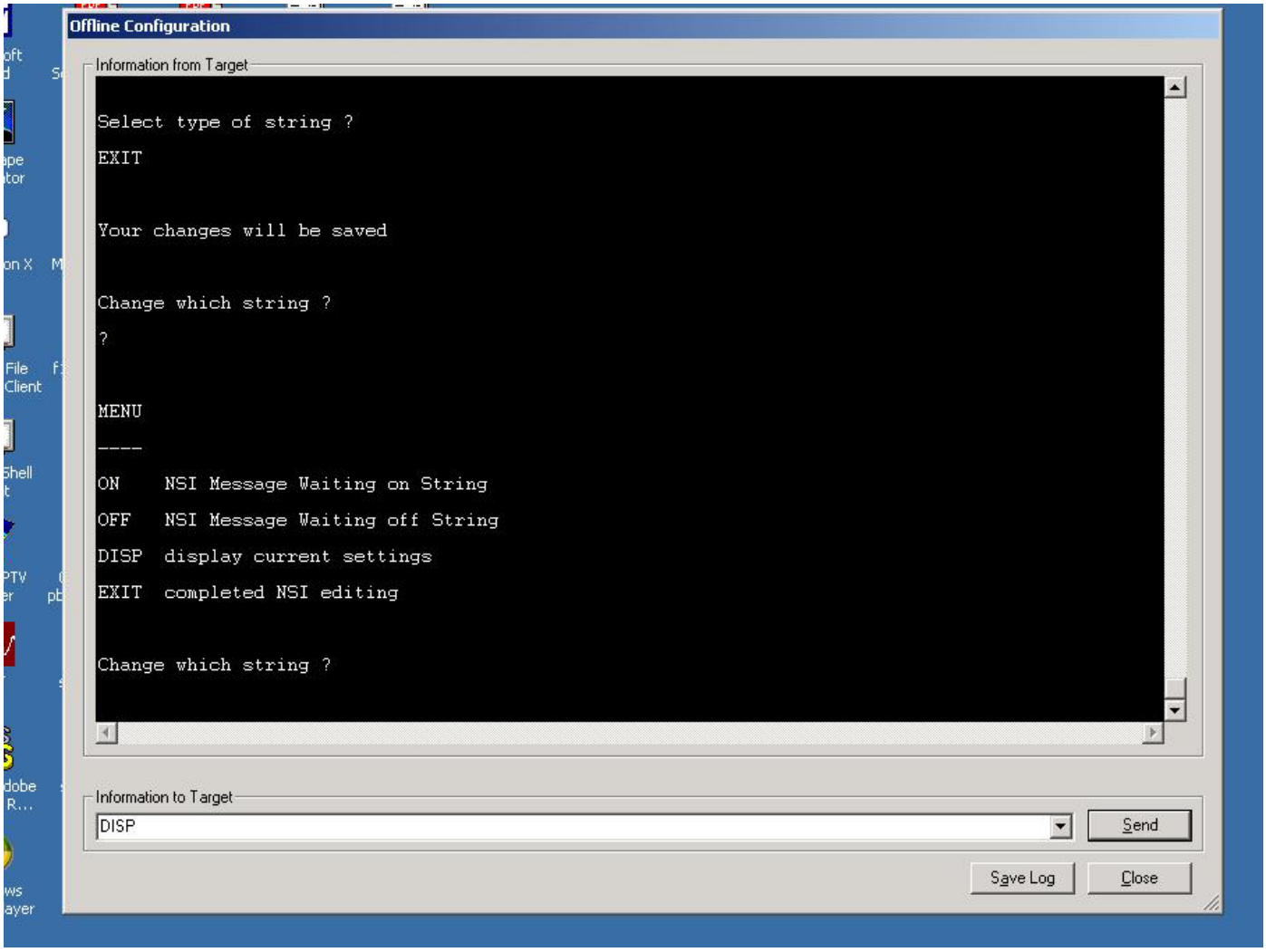


Figure 62. New NSI settings for DPNSS MWI ON/OFF. Select EXIT from submenu.

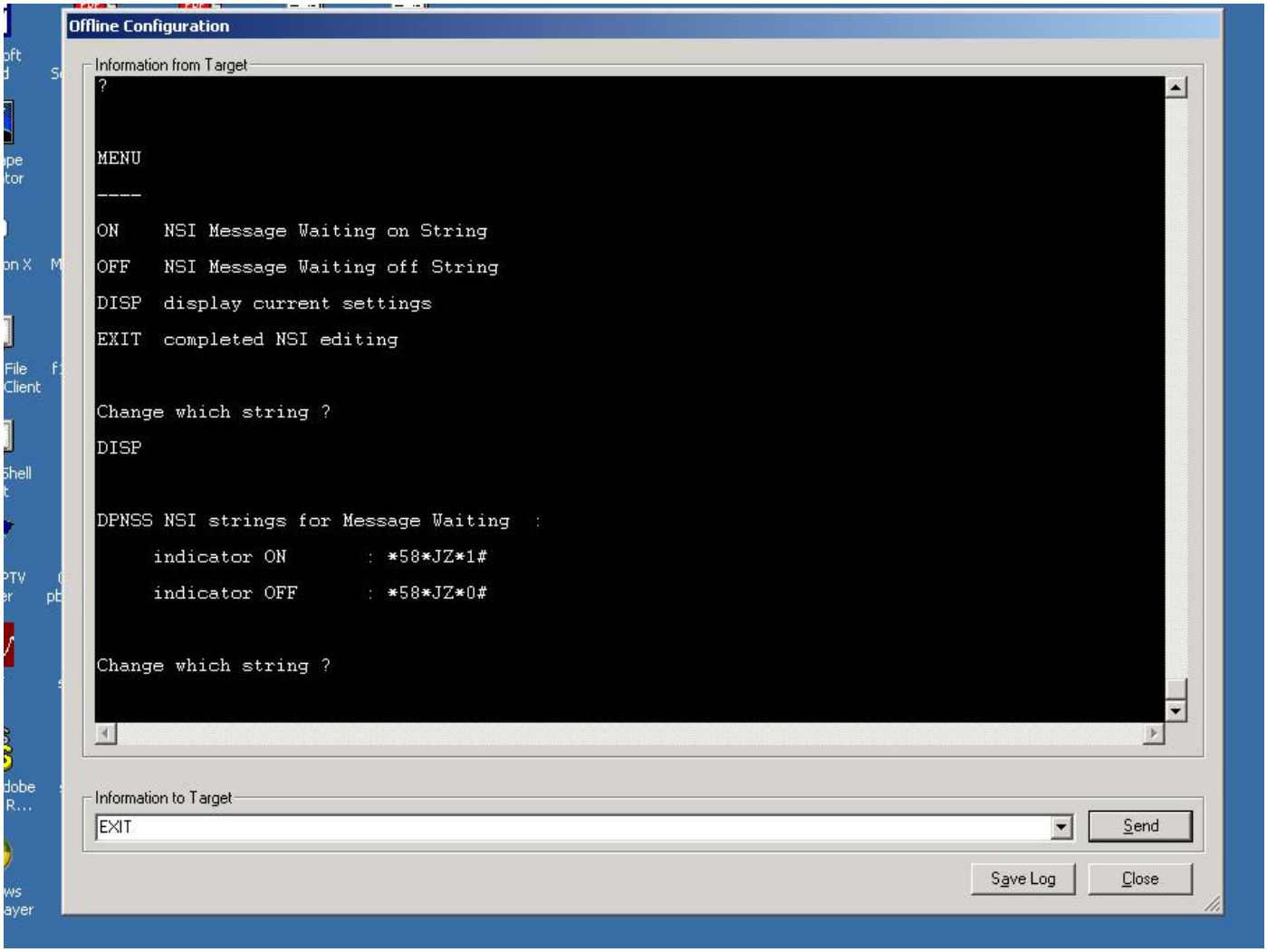


Figure 63. Interworking Parameters Menu. Select Exit from submenu.

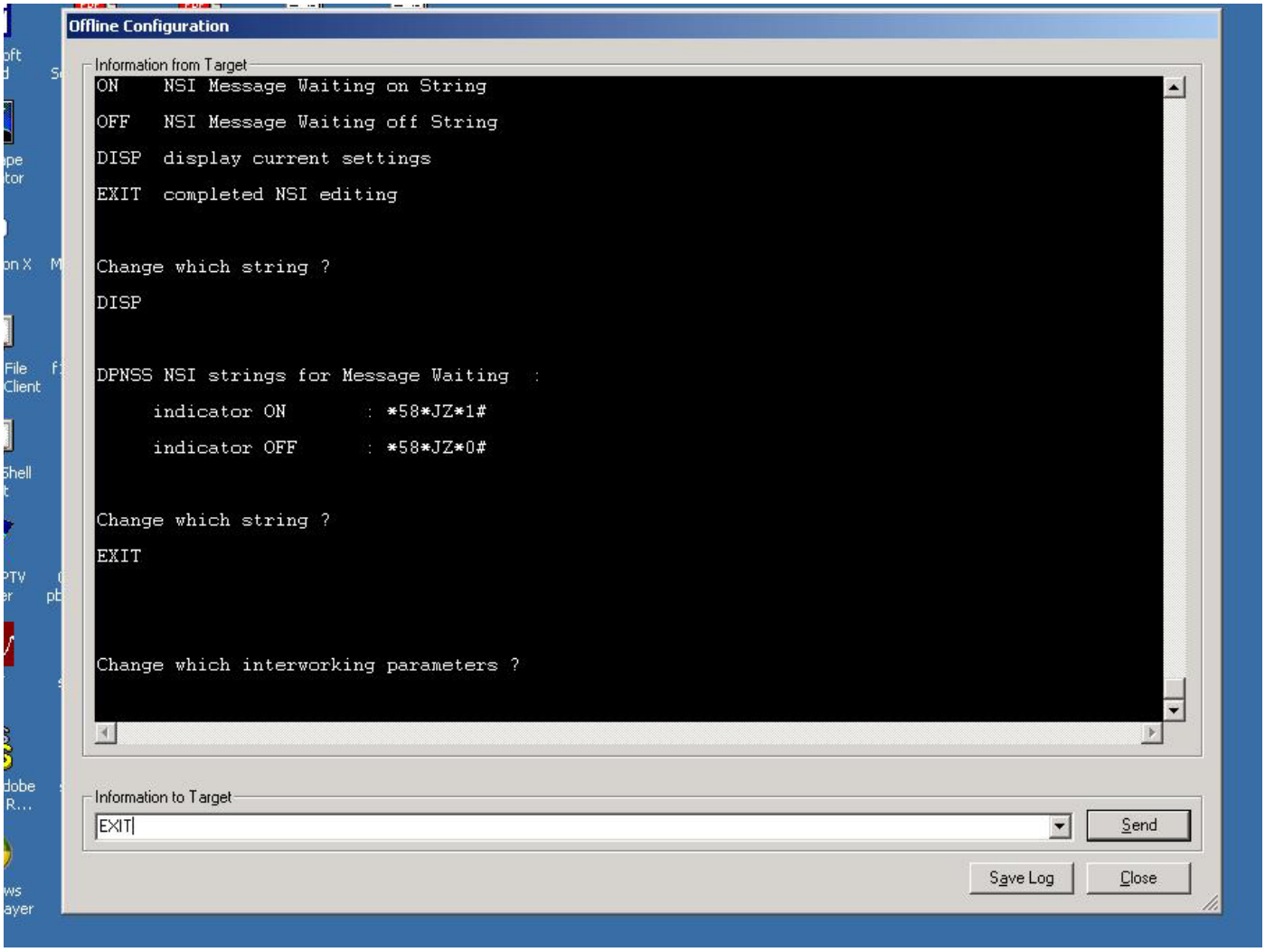


Figure 64. Advanced Configuration Menu: Select EXIT from menu.

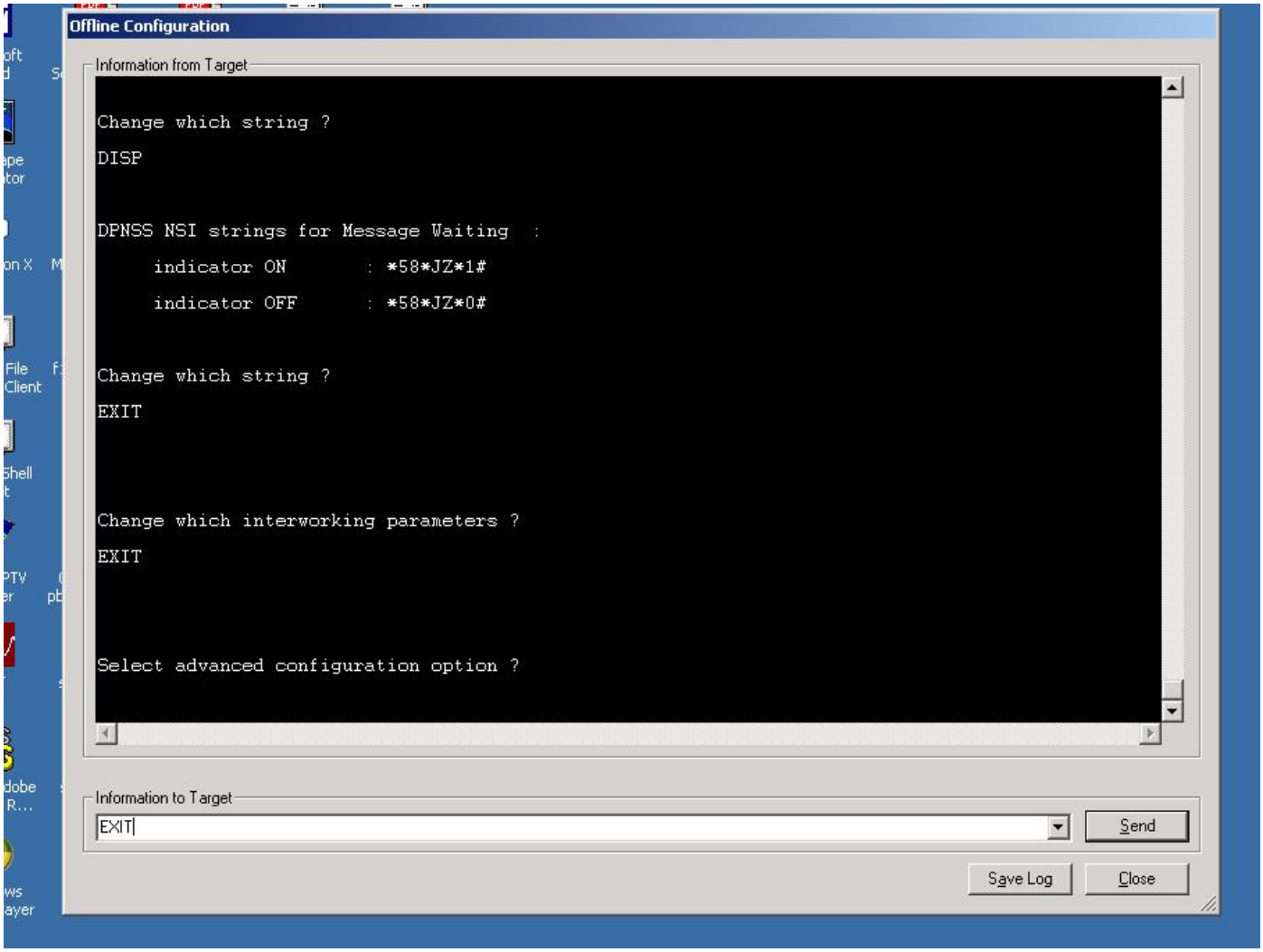


Figure 65. IiQ2000 main configuration menu. Select EXIT from command line configuration.

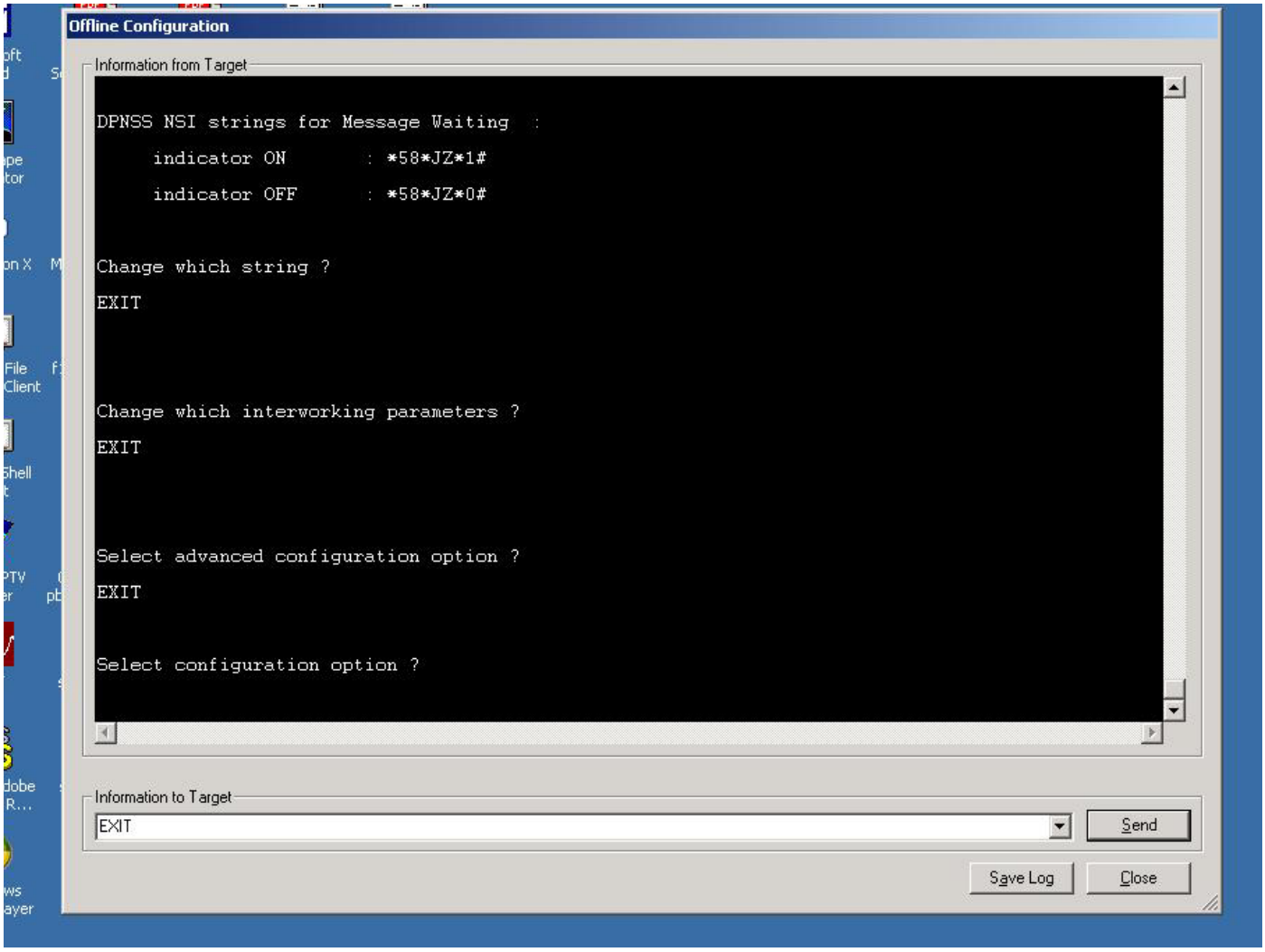
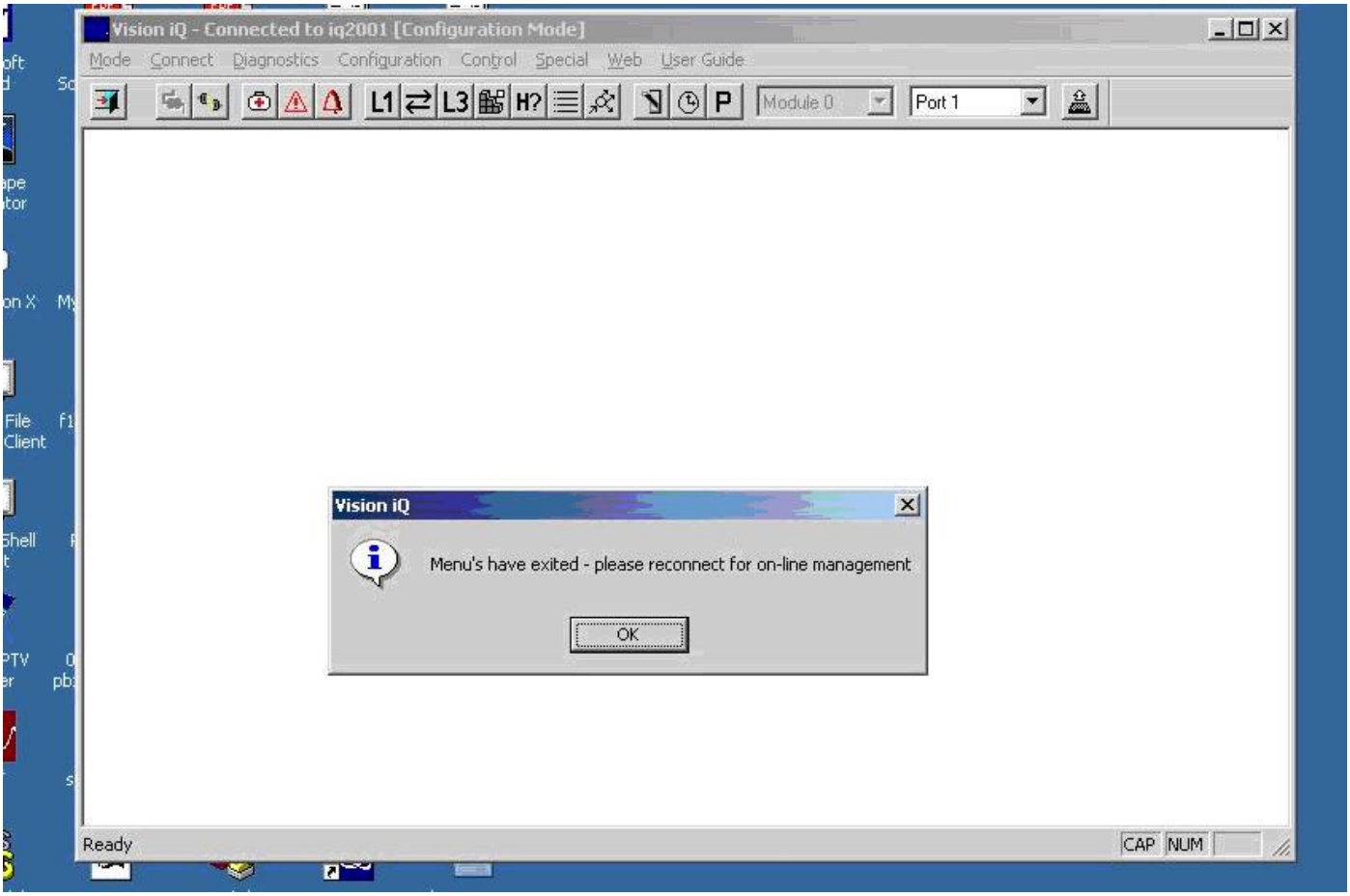


Figure 66. Vision iQ screen after exiting command line configuration screens.



Acronyms

Acronym	Definitions
DPNSS	Digital Private Network Signaling System as detailed in BTNR 188 and 189
NSI	Non-Specified Information – vendor specific free-form PBX-to-PBX messaging
IPT	IP Telephony
CCM	Cisco Unified CallManager
Q.931	ITU ISDN protocol at level 3
Q.Sig	ITU ISDN protocol enhancement to q.931 carrying additional features
MGCP	Media Gateway Control Protocol
PBX	Private Branch Exchange
MMI	Man Machine Interface – specifically on iSDX/Realitis, a VT100 style console
COS	Class Of Service – on an iSDX, the ability to activate features on a particular line
TAC	Trunk Access Class – the ability for an extension to use a specific trunk

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