

# *Emerald*

**Cisco IVR - Prepaid Voice**  
**Version 1.1**



**Emerald Management Suite**  
**IEA Software, Inc.**

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## Table of Contents

Software License Agreement.....	2
Table of Contents .....	4
Introduction .....	5
Requirements .....	5
Installation Overview .....	5
Cisco RADIUS Configuration.....	6
Packet-of-Disconnect (POD) settings.....	6
Cisco IVR debit card application setup .....	7
Emerald Configuration .....	8
Authentication filter.....	8
Authorization filter .....	8
Accounting filter.....	9
Emerald Configuration Check List .....	9
Emerald Admin / Rating Menu (If Used) .....	10
Miscellaneous .....	10
Rating Q&A .....	10
Known Problems .....	11
Troubleshooting Tips.....	11

## Introduction

Cisco routers with integrated interactive voice response (IVR) enable a variety of telephony applications such as caller authentication, prepaid calling cards and custom voice applications. While many voice applications are possible with Emerald and RadiusNT/X this document describes how to configure the Emerald Suite and Cisco IOS based routers to support prepaid calling cards. The prepaid IVR application provides a voice menu allowing the user to enter their prepaid calling card number, pin and destination number to use the network. Once entered the user is notified of the credit amount and time remaining based on their account balance and connected to the destination number.

## Requirements

This document assumes familiarity with several Emerald Subsystems, telephony concepts and network operating environments. While some guidance is provided it is highly recommended you review the following before continuing:

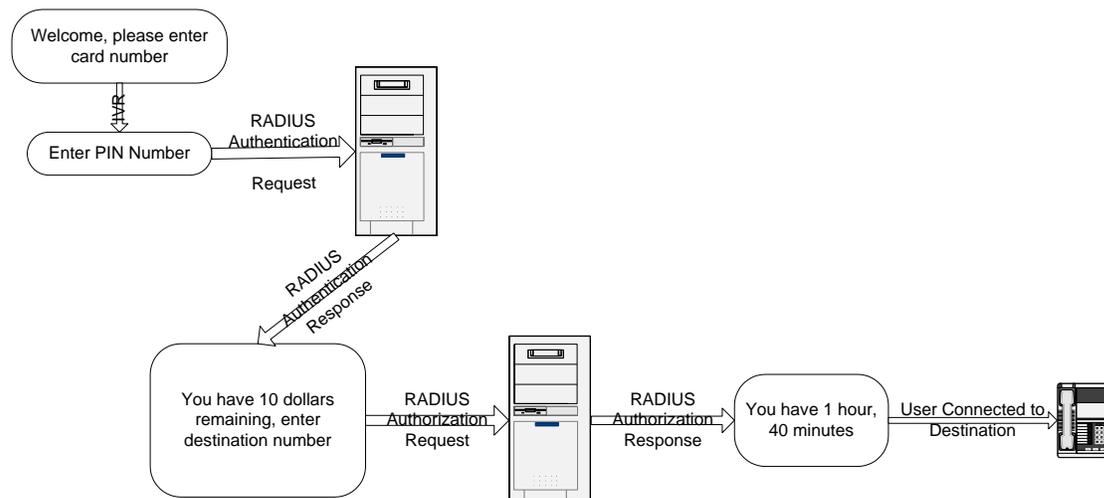
- ✓ Cisco IOS reference (<http://www.cisco.com/support>)
- ✓ Emerald v5 administrators guide – RADIUS / Server Groups (<http://www.iea-software.com/docs>)
- ✓ Emerald v5 administrators guide – RADIUS / Filter Groups (<http://www.iea-software.com/docs>)
- ✓ Emerald v5 administrators guide – Rating (<http://www.iea-software.com/docs>)

Additionally the following system requirements must be met:

- ✓ Cisco IOS version 12.2 or later voice gateway.
- ✓ Emerald 5.0.29 or later and RadiusNT/X 5.1.29 or later
- ✓ Must be licensed for RadiusNT/X and Rating
- ✓ TFTP server for storage of IVR applications and voice prompt
- ✓ Cisco IOS IVR TCL scripts and prompts (debitcard\_acct\_pin.1.1.0.tcl)

## Installation Overview

The diagram below shows a typical interaction of the prepaid card user with the voice gateway and its interaction with Emerald & RadiusNT/X.



We'll start by configuring RADIUS authentication, authorization and accounting in the Cisco access server. This provides the access gateway with the ability to query the end-users account balance and time remaining.

The next step will be to configure the prepaid debit card application on the Cisco access server. This enables IVR prompting the end-user interacts with through their telephone.

Finally we will configure all necessary RADIUS and application filters within Emerald to support the Cisco prepaid debit card application.

## Cisco RADIUS Configuration

Login to the Cisco access server with full "enable" permissions. Configure the access server to send RADIUS/AAA requests for Voice calling to Emeralds RadiusNT/X server. The following table provides an example of the necessary configuration commands.

Command	Description
aaa new-model	<b>Required</b> , sets the command entry syntax for RADIUS related configuration.
radius-server host x.x.x.x key enter_shared_secret_here	<b>Required</b> , configures the address and shared secret of the Emerald RadiusNT/X server.
radius-server retransmit 3	Optional, sets the request retry policy for authentication and authorization messages.
radius-server vsa send accounting	<b>Required</b> , enables sending of Cisco vendor specific attributes (VSA) for accounting.
radius-server vsa send authentication	<b>Required</b> , enables sending of Cisco VSAs for authentication.
aaa authorization exec h323 group radius	<b>Required</b> , enables IVR access to Emerald RadiusNT/X server.
aaa authentication login h323 group radius	<b>Required</b> , enables IVR access to Emerald RadiusNT/X server.
aaa nas port voip	Optional, sets the format of the NAS-Port attribute for non IVR managed call legs.
aaa session-id common	<b>Required</b> , session-id's must match between requests for proper accounting.
aaa accounting connection h323 start-stop group radius	<b>Required</b> , enables sending of voice related RADIUS accounting messages to the Emerald RadiusNT/X server.
gw-accounting h323 vsa	<b>Required</b> , enables sending of voice related RADIUS accounting messages to the Emerald RadiusNT/X server.

## Packet-of-Disconnect (POD) settings

POD enables preemptive disconnects of active sessions. When enabled active sessions can be closed from the Emerald online list or via the Emerald session manager. POD is useful to enforce account balance restrictions in "dynamic" situations via the Emerald session manager where for example multiple concurrent sessions are allowed for a single prepaid calling card or the end-users account status changes during an active call. Configuring POD is optional and not required to enforce maximum session duration restrictions based on prepaid account balance. POD may not work for voice sessions with earlier versions of Cisco IOS.

The following configuration command can be used to enable POD support in the access server.

Command	Description
aaa pod server clients x.x.x.x auth-type any server-key enter_shared_secret_here	<b>Required</b> , configures access server to accept POD disconnect requests from Emerald and the Emerald session manager.

## Cisco IVR debit card application setup

The final configuration step on the Cisco access server is to configure the debit card application enabling IVR prompting to the end user to enter their card number/pin and finally the destination number.

You will need a TFTP server loaded with the Cisco TCL scripts and voice prompts. This document assumes the application script debitcard\_acct\_pin.1.1.0.tcl is used.

The following configuration commands are used to configure the IVR application.

Command	Description
call application voice prepaid tftp://x.x.x.x/debitcard_acct_pin.1.1.0.tcl	<b>Required</b> , sets the location of the prepaid card application on the TFTP server.
call application voice prepaid uid-len 4	Optional, length of the calling card number.
call application voice prepaid pin-len 4	Optional, length of the calling cards pin number.
call application voice prepaid language 1 en	Optional, sets the IVR application language.
call application voice prepaid set-location en 0 tftp://x.x.x.x/prompts/en/	<b>Required</b> , sets the location of the IVR voice prompts

After the 'prepaid' application has been configured it is assigned to the appropriate dial peer. The following example assigns the prepaid application to the first line of a channelized t1:

```
dial-peer voice 1 pots
  application prepaid
  destination-pattern 5551414
  port 3/0:1
```

**Note:** Many Cisco IOS versions and hardware configurations require IVR voice prompting be done through the routers DSP/voice interfaces. IVR prompting may not be supported for requests initiated by H323/SIP clients. Please contact your Cisco representative for more information on where this is or is not supported.

At this point when accessing the telephone hardware defined by the dial peer(s) you should be greeted with the Cisco prepaid debit card IVR prompt.

## Emerald Configuration

Attribute data filters are used to provide the response attributes necessary to support the Cisco debit card IVR application. See the section on RADIUS / Filter Groups in the Emerald 5 admin guide for supporting information on configuring filter groups.

Filter Groups					
Filter Group	Description	Filter source	Dest type	Dest filter group	Dest data
<a href="#">Cisco IVR debit output</a>	Sets h323-credit-time for Cisco debit application for final authorization response	Auth Out	Filter Merge	<a href="#">Cisco IVR debit output dest</a>	
<a href="#">Cisco IVR debit</a>	Returns the h323-credit-amount in response to debit card authentication requests	Auth Req+Resp	Filter Merge	<a href="#">Cisco IVR debit dest</a>	
<a href="#">Cisco Voice accounting sink</a>	Sink envelope call leg for IVR debit application	Acct In	Source Specific		<a href="#">none</a>

### Authentication filter

We will begin by configuring a data filter to respond with the end-users available balance after entering their card number and pin. Create a destination filter group named “Cisco IVR debit dest” adding the following RADIUS attributes:

Vendor	Attribute	Data
Cisco	Cisco-AVPair	h323-credit-amount=\$amountleft
Cisco	Cisco-AVPair	h323-billing-model=prepaid

Create a source filter group labeled “Cisco IVR debit” with the following settings:

Filter Source: Auth Req+Resp  
 Destination filter group: Cisco IVR debit dest  
 Destination type: Filter Merge

Within this group we recommend matching the h323-ivr-out AVPair attribute so that this filter is only applied for authentication requests from the Cisco IVR.

Vendor	Attribute	Data	Search Option
Cisco	Cisco-AVPair	h323-ivr-out=	Starts With

Other search criteria may be added to further restrict application of this filter such as the access servers network address or other qualifying RADIUS attributes available in the authentication request.

### Authorization filter

The next filter required is used to alert the end-user of the time remaining for their call after their destination phone number has been entered. Create a destination filter group named “Cisco IVR debit output dest” adding the following RADIUS attributes:

Vendor	Attribute	Data
Cisco	Cisco-AVPair	h323-credit-time=\$sessiontimeout

Create a source filter group labeled “Cisco IVR debit output” with the following settings:

Filter Source: Auth Out  
 Destination filter group: Cisco IVR debit output dest  
 Destination type: Filter Merge

Within this group we will match the h323-billing-model=prepaid Cisco-AVPair attribute added by the “Cisco IVR debit dest” destination filter above.

Vendor	Attribute	Data	Search Option
Cisco	Cisco-AVPair	h323-billing-model=prepaid	String
Standard	Session-Timeout		Any Value

## ***Accounting filter***

When gateway accounting is enabled you will typically see at least two sets of accounting messages for different legs of the same call. The first “answer” set is generated by the end-users call to the Cisco IVR itself while the second “originate” set covers the end-users call to their destination number. Since typically you will be billing only the end-users call to their destination number you need only be concerned with the second “originate” set.

To accomplish this we will filter the “answer” call leg from being logged to the Emerald Calls table.

Create a source filter group labeled “Cisco Voice accounting sink” with the following settings:

Filter Source: Acct In  
 Destination type: Source Specific  
 Destination Data: none

Note the word “none” is spelled out in the destination data field above.

Within this group we will look for the h323-call-origin attribute to determine which call leg to remove by adding the following condition to the filter group:

Vendor	Attribute	Data	Search Option
Cisco	h323-call-origin	h323-call-origin=answer	String

This is the final required data filter. Provided the Emerald rating system and RadiusNT/X are properly configured you should now successfully be able to use the Cisco debit card IVR application with Emerald.

## ***Emerald Configuration Check List***

The following checklist should be reviewed to help assure the Emerald Suite has been properly configured to support prepaid calling cards. Please see the Emerald administrators guide and RadiusNT/X users guide for more information on each item.

## **RadiusNT/X Administrator – Advanced Menu**

- ✓ Time banking may be enabled for strictly time based rather than credit balance based access cards
- ✓ Concurrency control should be enabled if you would like to limit concurrent use of the same prepaid voice card
- ✓ Enable attribute filtering must be enabled
- ✓ Custom auth failure attributes must be enabled
- ✓ Enforce cost-based session limits must be enabled
- ✓ Allow rating of accounting call records must be enabled

## ***Emerald Admin / Rating Menu (If Used)***

- ✓ Rate Auth Requests Enabled
- ✓ Auth Session Limiting should be set Limit Session to available balance

## ***Miscellaneous***

- ✓ Is your Cisco access servers IP address and shared secret configured in Emerald under RADIUS / Server Groups?
- ✓ If POD support is enabled is the Disconnect port defined for the access server in Emerald under RADIUS/Server Groups?
- ✓ If POD support is enabled is the Emerald session manager service installed and started?

## **Rating Q&A**

**Q.** Does RadiusNT/X enforce access limits in proportion to the end-users credit balance to prevent leakage of service?

**A.** Yes, available time is calculated using all of the same rules actual usage is billed with including changes in time of day, day of week, reseller status, and the per session rounding option used. It is however possible to configure the system in a way that requires “dynamic” knowledge of a session in some situations to enforce defined limits. With prepaid calling cards this typically occurs if you will be allowing the same prepaid card to be used more than once at the same time.

Since the time remaining calculation of the initial session could not predict subsequent use while the initial session is still active the actual time remaining for the initial session is no longer accurate. The Emerald session manager can be used to help enforce these “dynamic” situations by disconnecting active sessions who when combined overstep their credit and or time limits.

**Q.** Can I prevent specific number or number prefixes from being called?

**A.** Yes, this can be configured through the Rating system. If the rating rule set has a rating type of “Voice Destination Rating” use the following three steps from the rule set “configure” link to construct a deny list.

1. Create a destination set labeled “Banned Numbers” containing a listing of banned numbers or prefixes.
2. Create a condition labeled “Reject Auth” containing just the auth-reject upload attribute.
3. From the Destination rates menu associate the “Banned Numbers” destination set to the “Reject Auth” condition.

**Q.** How can I import my rate tables into Emerald?

**A.** If using rule sets with a rating type of “Voice Destination Rating” rates can be imported to the RateVDNISItems table in the Emerald database. Please see the Rating section of the Emerald administrators guide for additional information.

**Q.** Can Cisco specific fields in RADIUS accounting messages be stored in the Emerald Calls table?

**A.** Yes, using a database management tool add a new column to the Emerald Calls table matching the attribute name you would like to store except without dashes and click the ‘Apply’ button in the Emerald Admin to have the change take effect. RadiusNT/X will also automatically parse out attribute names embedded in the data field of the Cisco-AVPair attribute for logging as required. Alternatively VSA

mapping can be used to map the VSA attributes into an existing field. Please see the Emerald administrators guide for additional information.

**Q.** What about non-Cisco softswitches such as Quintum?

**A.** This guide is specifically for Cisco hardware. The procedure for Quintum hardware should be very similar.

## **Known Problems**

None at this time.

## **Troubleshooting Tips**

Initially it is often useful to enable debugging on the access server and run RadiusNT/X in debug mode to see what is occurring between systems.

Useful Cisco debug commands:

```
Debug voice ivr
Debug voice aaa
Debug aaa pod
Debug aaa authentication
Debug aaa authorization
```

RadiusNT/X can be started in debug mode by stopping the server from running as a service or background task and running `radius -x15` from your Emerald or RADIUS folder

Additionally Emerald includes a syslog server that can be used to log messages from the Cisco access server. Syslog messages logged using the Emerald syslog server can be access from the Emerald Reports / System Log menu option. You can also run our syslog server in non database logging debug mode by running `syslogd -debug -nolog` from the Emerald folder.