



# IP Office - Job Aid

## Least Cost Routing Menu Examples

### **Summary**

This document shows how the Least Cost Routing (LCR) menu operates within the IP Office configuration. This is done by examples.

Note: The LCR menu is not compatible with shortcodes using the ; character (used for T1/PRI line) or the secondary dial tone feature. To achieve least cost routing on those lines refer to the Job Aid "Least Cost Routing for T1/PRI Lines & Lines Using Secondary Dial Tone".

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# Least Cost Routing

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## Overview

Least cost routing allows calls to be routed making the best use of system resources. This document looks at least cost routing using the Least Cost Route forms in the IP Office configuration.

- **Note:** The LCR menu is not compatible with shortcodes using the ; character (used for T1/PRI line) and secondary dial tone features. To achieve least cost routing on those lines refer to the Job Aid "Least Cost Routing for T1/PRI lines & Lines Using Secondary Dial Tone".

Least cost routing (LCR) uses the following standard elements of IP Office Configuration:

- **Short Codes:**  
Shortcodes are used to match the dialed number. When a match occurs, the matching short code indicates the number that should be output and which line group to use.
  - Shortcodes in a Least Cost Route form are applied after any User or System short code but before Line Shortcodes.
- **Outgoing Group IDs:**  
Outgoing Group IDs are used to group lines. Typically a separate group ID will be used for lines from different PSTN service providers.

In addition the following elements can also optionally be used:

- **Time Profiles:**  
Time Profiles can be used to set when a particular set of Least Cost Route settings are used.
- **Alternate Routes:**  
If a call is routed by Least Cost Routing to a Outgoing Group ID in which all the lines are busy, then after an adjustable timeout, the IP Office can look for a another short code match in a further set of Shortcodes.
- **Priority:**  
Each user has an assigned priority between. High priority users can bypass route settings with a lower priority. Low priority user must wait for a busy period to expire before they can try a higher priority route setting.

## Manager Configuration Settings


The following settings within IP Office Manager relate to Least Cost Routing.

### User Settings

The key User setting is in the **User** form on the **User** tab.

- **Priority:** *Default = 5*  
Used by Least Cost Routing to determine with routes a user can use.

### Least Cost Route Settings

Click on the Least Cost Route icon  to display the list of existing routes. Right-click on the list area or an existing route to select **View**, **Edit**, **Delete** or **New**.

#### LCR tab:

- **Name:**  
Used to identify the route.
- **Time Profile:**  
The routes settings will only apply at times defined by the time profile. If no Time Profile is selected then the route settings apply at all times.

The three routing tabs; **Main Route**, **Alternate Route 1** and **Alternate Route 2**, all contain the same settings.

- **Timeout (secs):** *Default = 30 seconds*  
When a call goes to a line group where all lines are busy, this timeout sets how long the system waits before trying the options in the next tab.
  - If the user has been routed to a short code, which is set to the **Busy** feature, then they remain at busy.
- **Priority:** *Default = 5*  
If the user's priority is higher than that of the tab, routing is applied using the Shortcodes in the tab and those in the next tab. When a short code exists in both tabs the higher priority short code is used.
- **Allow Bump:** *Default = Off*  
When the lines indicated by a route are being used by a multilink PPP data call, if this option is selected, the user's call is able to seize a line from the data call.
- **Short Code List:**  
These perform dialed number matching. When a match occurs, the matching short code indicates the telephone number to outdial and the line group in which a line should be seized. To add a short code, right-click on the list and select **Add**.
  - The only short code features that should be used in a Least Cost Route short code are: **Dial**, **Dial3K1**, **Dial56K**, **DialEmergency**, **DialSpeech**, **DialV110**, **DialV120**, **DialVideo** and **Busy**.
  - The ; character and [n] syntax cannot be used.

### Line Form

The key line setting here is the **Outgoing Group ID**. This is used by Shortcodes to match which lines can be used to route an outgoing call.

## Example: Fallback Carrier Routing

In this example the customer has lines from two separate providers.

The required routing is:

- Local and national calls should go via the standard provider's lines.
- International calls should go via the alternate provider's lines.
- If all lines to the alternate provider are busy, users should be able to use the standard providers lines

To achieve this the following configuration changes were made:

- Lines to the standard provider were given the Outgoing Group ID 0.
- Lines to the alternate provider were given the Outgoing Group ID 10.
- In Least Cost Route, a new route called "Fallback" was added.
- The Main Route tab is programmed as follows:

The screenshot shows the 'LeastCostRoute Fallback' window with the 'Main Route' tab selected. The 'Timeout (secs)' is set to 5 and 'Priority' is set to 5. The 'Allow Bump' checkbox is unchecked. A table lists the route configuration:

Code	Telephone Number	Feature	Line Group Id.
9011N	011N	Dial	10

Buttons at the bottom: OK, Cancel, Help.

- **9011N:** This shortcode matches any dialing beginning with 9011, ie. an international call. It strips the 9 and then tries to seize a line in group 10 to dial the number.
- The timeout is 5 seconds. This means that if after 5 seconds the system is still unable to seize a line from Line Group 10, it should look for an alternate short code match (against the original dialed digits) in the Alternate Route 1 tab.
- The Alternate Route 1 tab is programmed as follows:

The screenshot shows the 'LeastCostRoute Fallback' window with the 'Alternate Route1' tab selected. The 'Timeout (secs)' is set to 30 and 'Priority' is set to 5. The 'Allow Bump' checkbox is unchecked. A table lists the route configuration:

Code	Telephone Number	Feature	Line Group Id.
9011N	011N	Dial	0

Buttons at the bottom: OK, Cancel, Help.

- **9011:** The shortcode again matches any international dialing. This time however it tries to seize a line in Line Group 0.

## Example: Using an Alternate Carrier

In this example the customer's lines are all from the same provider. However the customer wants any calls other than local calls to go via an alternate carrier.

The required routing is:

- All calls go via the same set of lines.
- Any national or international calls should be prefixed with the alternate carrier's access code (123), a short pause and a customer ID number (123456).
- The alternate carrier also provides billing by extension number, so insertion of the dialing extension number is desired.
- Local numbers dialed in full (ie. with the local area code) should not go via the alternate carrier.
- Toll free numbers provided by the line provide should not go via the alternate carrier.

To achieve this the following configuration changes were made:

- All the PSTN providers' lines have been left in **Outgoing Group ID 0**.
- In Least Cost Route, a new route called "Alternate" was added. The following settings were added to the Main Route tab:

Code	Telephone Number	Feature	Line Group Id.
9011N	123,123456E011N	Dial	0
91800N	1800N	Dial	0
91866N	1866N	Dial	0
91877N	1877N	Dial	0
91888N	1888N	Dial	0
91N	123,123456E1N	Dial	0
9xxxxxxxx	N	Dial	0

- **9011N**: This shortcode matches anyone dialing an international number. Before trying to seize a line it insert the information required by the alternate call carrier. The , (comma) adds a pause, the E send the dialing extension number.
- **91N**: This shortcode matches anyone dialing an national number and again inserts the information required to route the call via the alternate call carrier.
- **91800N, 91866N, 91877N, 91888N**: These shortcodes match national numbers that are toll free and so do not need to be routed via the alternate call carrier.
- **9xxxxxxxx**: This shortcode matches any local dialing. These calls are not routed via the alternate call carrier.

## Example: International Call Restriction

In this example we want to restrict who makes international calls.

The required routing is:

- Users with a priority of 5 or lower should not make international calls.
- Users with a higher priority can make international calls.
- The customer has an overseas office to which all users should be able to make calls.

To achieve this the following configuration changes were made:

- Those extension users who are allowed to make international calls had their Priority set to 6. This is done through the User tab of the User form.
- In Least Cost Route, a new route called "International" was added.
- In the Main Route tab the required priority was left as 5.

The screenshot shows the 'LeastCostRoute International' dialog box with the 'Main Route' tab selected. The 'Timeout (secs)' is set to 30 and 'Priority' is set to 5. The 'Allow Bump' checkbox is unchecked. A table lists two entries:

Code	Telephone Number	Feature	Line Group Id.
9011441555364N	011441555364N	Dial	0
9001N	.	Busy	0

Buttons at the bottom: OK, Cancel, Help.

- **901141555364N**: This shortcode matches DID numbers at the overseas office and allows any user to dial those numbers.
- **9011N**: This shortcode matches the dialing of any other international numbers and returns busy tone to the dialer.
- For users with Priority higher than 5, the IP Office immediately looks for a short code match in the Alternate Route 1 tab as well as the Main Route tab. When identical shortcodes exist the one in the Alternate Route tab takes precedence.

The screenshot shows the 'LeastCostRoute International' dialog box with the 'Alternate Route1' tab selected. The 'Timeout (secs)' is set to 30 and 'Priority' is set to 5. The 'Allow Bump' checkbox is unchecked. A table lists one entry:

Code	Telephone Number	Feature	Line Group Id.
9011N	011N	Dial	0

Buttons at the bottom: OK, Cancel, Help.

- **9011N**: Again this shortcode matches international number dialing but this time it allows such calls rather than returning busy tone.

## Example: Small Community Network VoIP Routing

In this example the customer has two IP Office systems. In addition to their own external lines, the two sites are linked by a data link. The data link has been configured as a VoIP VPN link and uses IP Office Small Community Networking.

- System A has extensions and groups numbered from 200 upwards.
- System B has its extensions and groups numbered from 500 upwards.
- The customer wants anyone at Site A dialing the external number of Site B or a DID at Site B to have the call re-routed via the VPN link.

To achieve this the following changes were made on System A.

- The VPN lines from System A to System B were put into Outgoing Group ID 5.
- In Least Cost Route a new route called "SiteB" was added.

LeastCostRoute Site B

LCR Main Route Alternate Route1 Alternate Route2

Timeout (secs) 30

Priority 5

☐ Allow Bump

Code	Telephone Number	Feature	Line Group Id.
91555392200	500	Dial	0
91555364N	N	Dial	0

OK Cancel Help

- In the Main Route tab the following Shortcodes were added:
  - **91555392200**: This shortcode matches the main reception number at Site B. The shortcode changes the number to the main group at Site B and re-routes the call to the VPN Link.
  - **91555364N**: This shortcode matches the dialing of DID numbers of extensions and groups on System B. It removes everything apart from the extension /group number and routes the call to the VPN link.

Similar changes would also be implemented on System B to reroute return calls.

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