

## 1. Which secondary path does a route follow in the event of a link failure?

Many network design tasks require knowing the alternate paths in the event of link failures, for an end-to-end service path such an MPLS tunnel, routes to a disaster recovery SAN, or a VoIP path. Traditional network design tools suffer from lack of dynamic and real-time knowledge of the network – their path as indicated in the simulated design of the network is likely to be out-of-sync with the network as it is running right now. Ping and Traceroute tools give information about the current path but do not allow playing out a hypothetical link down scenario. Route Explorer quickly and easily lets the user see this and other scenarios.

There are two ways to highlight a path in Route Explorer's database – by “point-and-click” on source and destination routers in the topology map itself or by specifying a destination prefix and source router. The route highlighted may be as it is right now, or at any time in the past in the recorded history of the topology (for forensic diagnosis or historical path performance analysis).

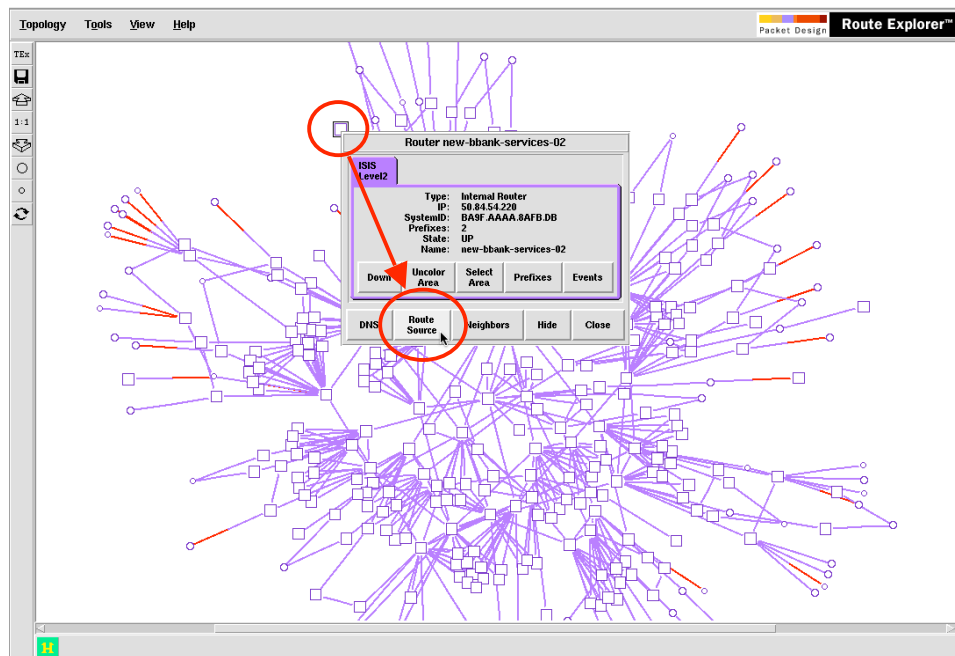


Figure 1

To highlight a route by point-and-click, right click on the source router. A popup menu will be displayed with the node information. See Figure 1. Click on “Route Source”. The source router will be highlighted in yellow. Next, right click on the destination router and click on “Route Destination” in the resulting popup. See Figure 2. The entire route will be highlighted in yellow. See Figure 3.

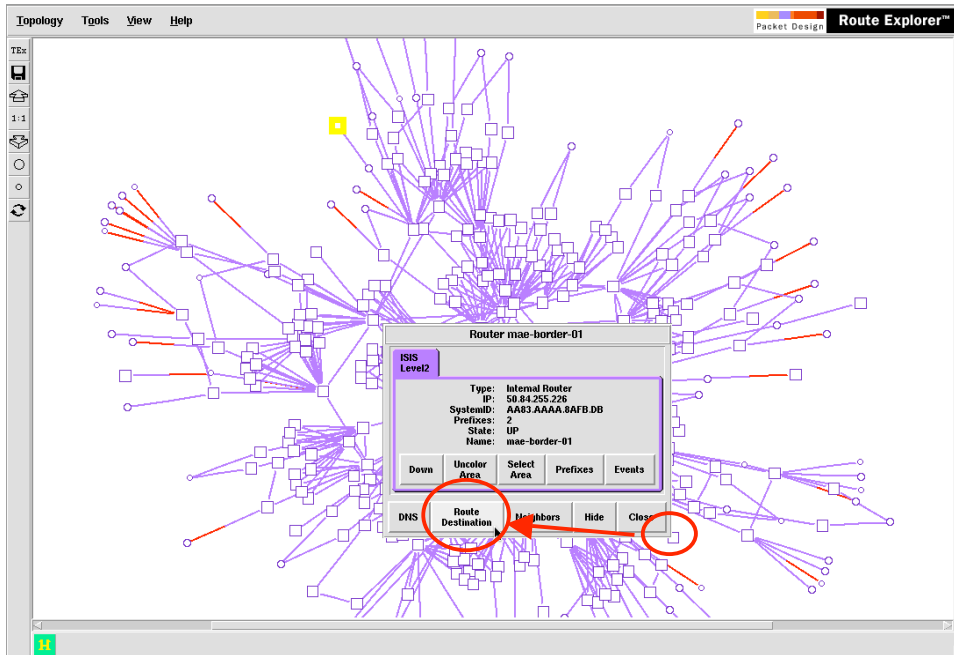


Figure 2

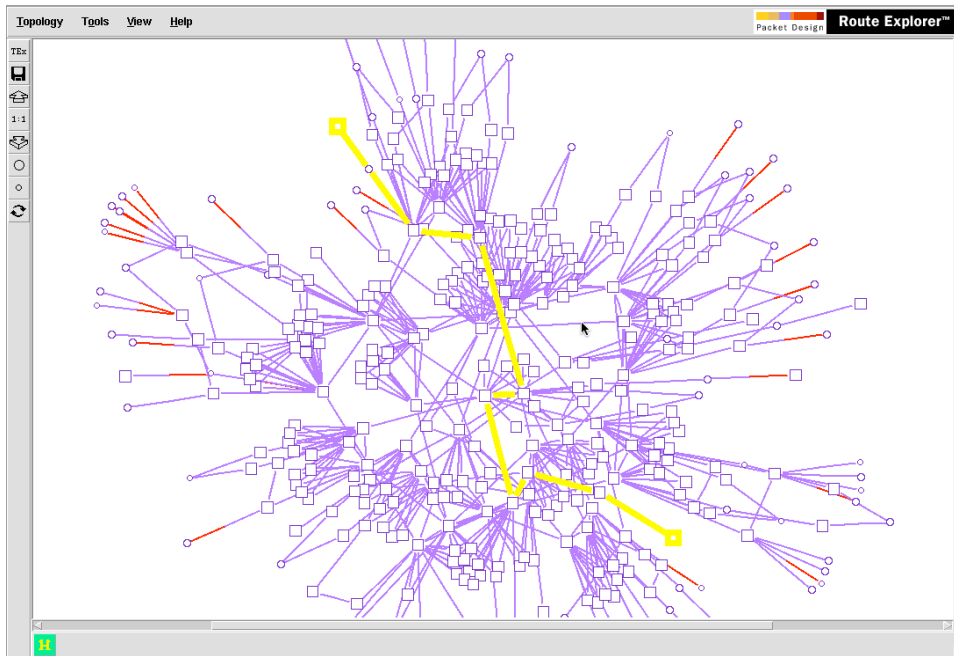


Figure 3

To see the route in detail, select Tools->List Highlighted Paths menu item. Route Explorer will display a list of each hop in the route, including the link metric, protocol, and how the next hop was resolved. Click on any row in the table to highlight that hop in the topology map. See Figure 4.

Path	Source Node	Destination Node	Metric	Protocol	Resolved by Prefix
new-bbank-services-02 -> mae-border-01					
1	new-bbank-services-02	50.84.42.184/30	5	ISIS	50.84.255.226/32
2	50.84.42.184/30	bbank-backbone-03	0	ISIS	50.84.255.226/32
3	bbank-backbone-03	bbank-backbone-01	1	ISIS	50.84.255.226/32
4	bbank-backbone-01	bush-backbone-02	24	ISIS	50.84.255.226/32
5	bush-backbone-02	bush-backbone-01	1	ISIS	50.84.255.226/32
6	bush-backbone-01	washarea-backbone-03	21	ISIS	50.84.255.226/32
7	washarea-backbone-03	westemdc-backbone-03	2	ISIS	50.84.255.226/32
8	westemdc-backbone-03	westemdc-border-03	5	ISIS	50.84.255.226/32
9	westemdc-border-03	mae-border-01	5	ISIS	50.84.255.226/32

Figure 4

To highlight a path from a source router to a destination prefix, click on Tools->Find Prefix Path... A popup window will be displayed. Enter the source router address and destination prefix in this window. See Figure 5.

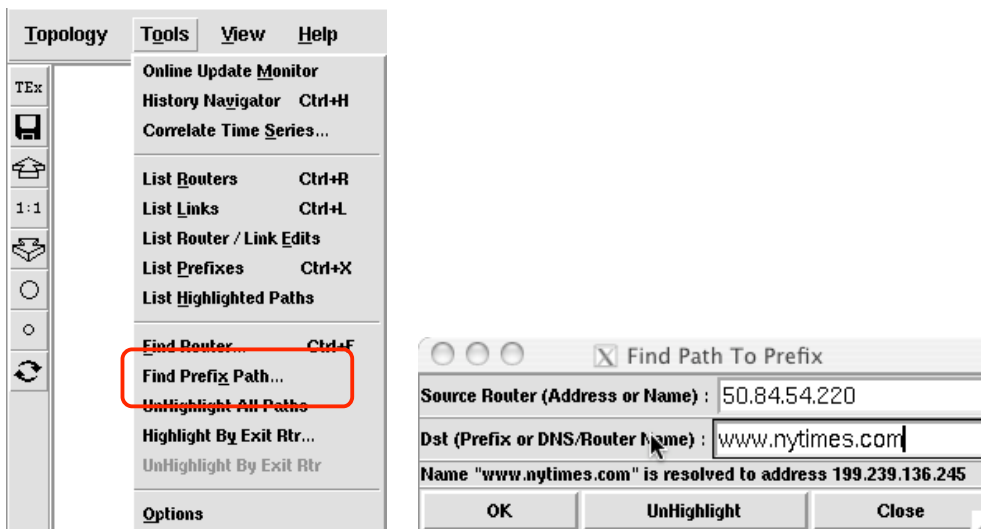


Figure 5

The path will be highlighted in the topology map in yellow. The list of highlighted paths can provide details of the hops. Note that in this example, the prefix is an external domain ([www.nytimes.com](http://www.nytimes.com)). Route Explorer's multi-protocol routing analysis capability enables it to find the exit router and highlight the path using both IGP and BGP protocols. See Figure 6.

Path	Source Node	Destination Node	Metric	Protocol	Resolved by Prefix
new-bbank-services-02 -> 199.239.136.245/32					
1	new-bbank-services-02	50.84.42.184/30	5	BGP/ISIS	50.84.255.158/32
2	50.84.42.184/30	bbank-backbone-03	0	ISIS	50.84.255.158/32
3	bbank-backbone-03	bbank-backbone-01	1	BGP/ISIS	50.84.255.158/32
4	bbank-backbone-01	bush-backbone-02	24	BGP/ISIS	50.84.255.158/32
5	bush-backbone-02	richardson-backbone-01	4	BGP/ISIS	50.84.255.158/32
6	richardson-backbone-01	richardson-border-02	5	BGP/ISIS	50.84.255.158/32

Figure 6

Having thus highlighted a path in Route Explorer, link failure analysis is now possible. To simulate the failure of any particular link in the highlighted path, simply right click on the link itself in the topology map. A popup menu will be displayed showing the details of the link. See Figure 7.

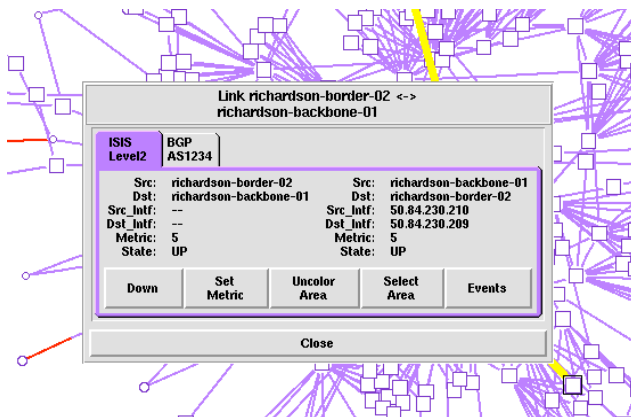


Figure 7

Click on “Down”. The link will be shown in red and the highlighted path will be redrawn to the next best route. In this instance, at the cost of one extra hop. See Figure 8. The list of highlighted paths will show the extra hops when you click “Reload”. A list of “edited” links can be shown by clicking Tools-> Show Router / Link Edits. See Figure 8 at the bottom right.

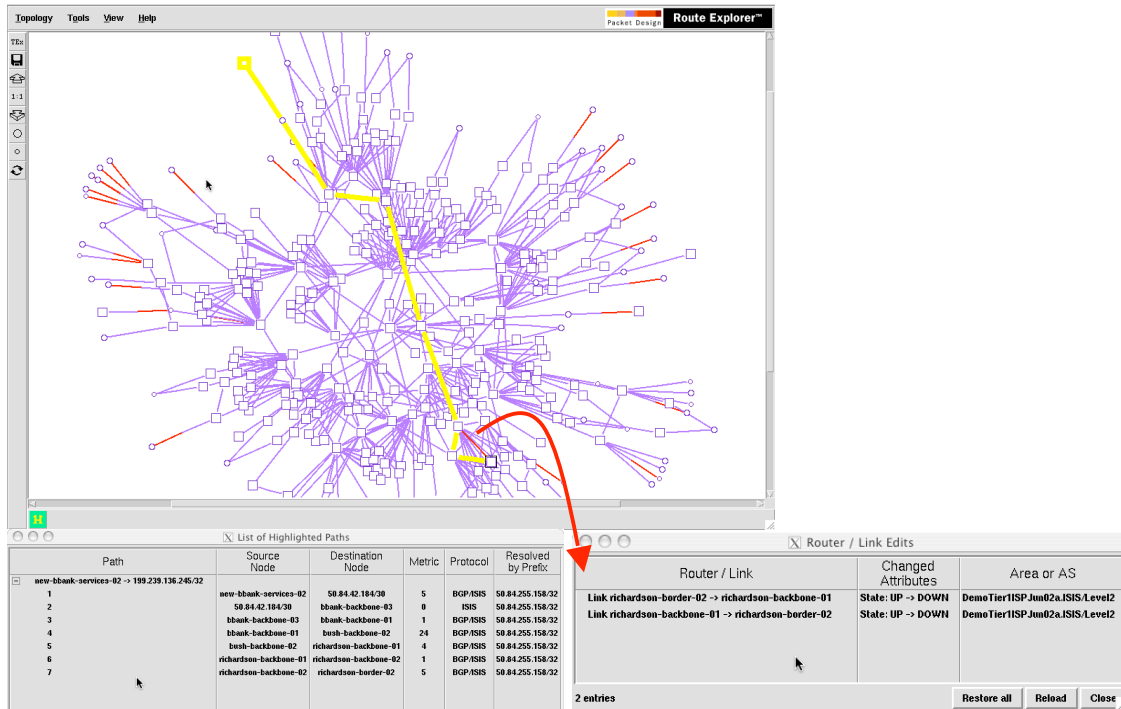


Figure 8

To see the effect of the next link failure, see Figure 9. This analysis can be continued on a hop by hop basis to find the best alternate path for this route.

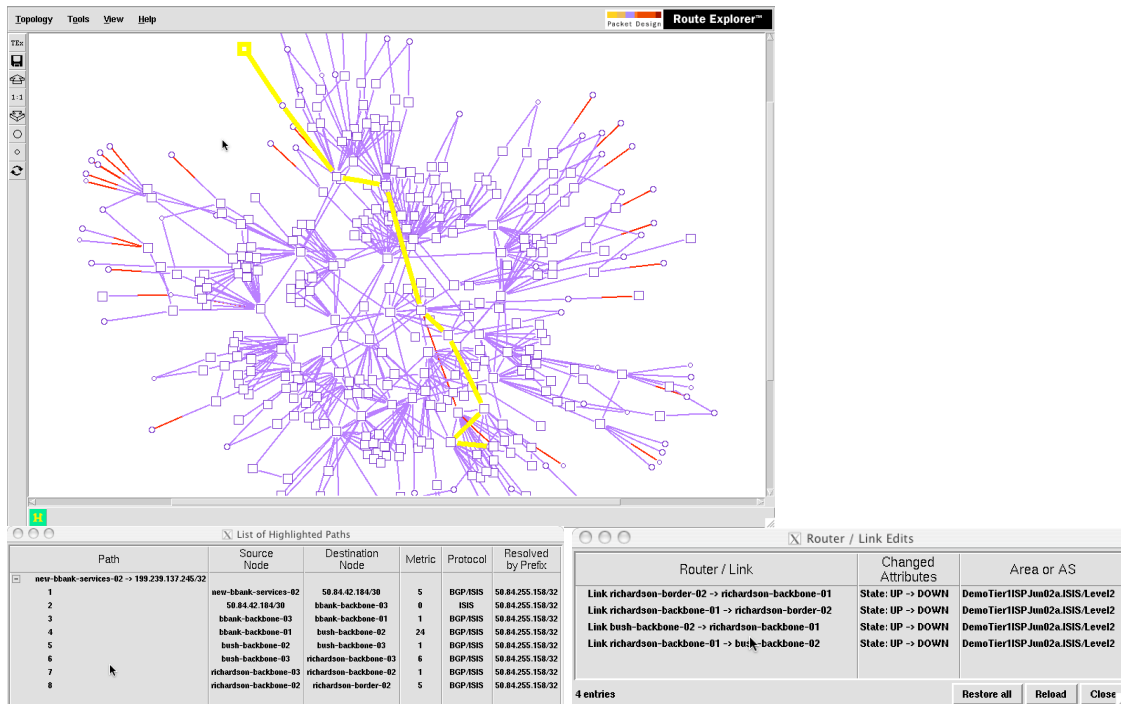


Figure 9

This note has shown how Route Explorer provides the most up-to-date routing path information and relevant failure simulation for planning and configuring service paths

in a dynamic routing network. This unique Route Explorer capability can save hours or days in the design and rollout of new services such as VoIP and MPLS VPNs.

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**HOW TO:**

1. Open an X Windows or VNC session to the Route Explorer. See Route Explorer User Guide for details.
2. Click on File->Open Topology
3. Select the topology domain "DemoTier1ISPJun02a" from menu.
4. Click Open.
5. Highlight a route:
  - a. Right-click on source router
  - b. Click "Route Source" in node pop-up menu
  - c. Right-click on destination router
  - d. Click "Route Destination" in pop-up
6. To see the route in hop-by-hop detail, select Tools->List Highlighted Paths
7. Down a link:
  - a. Right-click on link
  - b. Click "Down" in link pop-up menu
8. Show all simulated changes: Select Tools->List Router/Link Edits
9. Restore edits:
  - a. Click on "Restore All" in list of edits
  - b. Up the individual links or nodes via pop-up menu (right-click on item)