

## Avoid the Frailties of the Internet with Intelligent Route Control

*Is your organization addressing the risks inherent in the Internet reactively or proactively? In some cases, the reactive philosophy of disaster recovery addresses these risks via infrastructure redundancy. However, business continuity demands a proactive approach to dealing with risks that don't always manifest themselves as failures, but as service degradations that negatively affect business operations and that can precipitate business-critical disasters.*

*Intelligent route control solutions are effective in proactively addressing the major risks inherent to the Internet with necessary flexible policy controls and reporting mechanisms.*



### Risk: Economic

**Solution:** Intelligent route control solutions allow the user flexible performance policies while optimizing cost, which is made possible by measuring performance to all relevant destinations across each transit while also considering the cost of each transit.

Intelligent route control solutions allow the user to specify their own policy in terms of performance and cost. Therefore, it is possible to specify that the low-cost network be used for all traffic unless there is a performance problem, at which time a more expensive candidate may be used. These decisions are made based on three criteria: user-defined policy, aggregate bandwidth utilization for each transit provider, and empirical performance metrics.

Compared to the arbitrary metrics offered by Border Gateway Patrol (BGP), intelligent route control solutions can overcome best-effort delivery shortfalls and high-network costs by allowing users to specify relevant cost and performance policies. Since BGP prefers routes that are logically close (via AS Path attribute), it is common for the largest and most extensively peered networks to be 'close' to most destinations on the Internet. It is also common for the largest networks to be the most expensive in terms of bandwidth. As a result, BGP tends to direct traffic to the most expensive networks.



### Risk: Technology

**Solution:** Instead of relying on BGP to make route selections, intelligent route control solutions take empirical measurements that determine current, real-time performance characteristics of the Internet. The real-time observation of traffic and path characteristics allows intelligent route control solutions to identify problems and shift traffic quickly without waiting for slow BGP convergence. In the event of a disaster where reachability is lost, the route control solution is capable of making a routing change nearly twice as fast as BGP converges end-to-end. In pathological cases such as a wide-scale ISP outage, the factor is much higher. In fact, BGP will not ever converge to a new path when the current path is merely degraded, because BGP has no insight into path performance.

Alternate path analysis also allows an intelligent route control solution to gauge path stability and avoid sending traffic down paths that are problematic due to route oscillations, black holes, or routing loops. BGP is unable to identify such pathologies since there is an implied trust between routers, and most advertisements are assumed valid.

Since intelligent route control solutions constantly measure path characteristics, pathologies are quickly identified, and the offending paths are eliminated from possible selection.





### Risk: People

**Solution:** The people risk to the Internet is largely unpredictable and even more difficult to quantify; however constant measurement, reporting and leveraging of all available service providers can eliminate that risk.

With a keen eye on the network's performance, intelligent route control is able to address problems quickly and report network trouble to the operator so that it can be shared with upstream providers.

Situated at the edge of an enterprise network, intelligent route control devices maintain the vantage point that is most relevant to the enterprise and focuses only the enterprise's traffic, as opposed to the vast aggregate of traffic considered downstream by their service providers. Furthermore, the maintenance and traffic engineering activities of downstream network operators does not go unnoticed by the route control device's measurement facilities.



### Risk: Environment

**Solution:** Most issues related to the Internet environment such as fiber cuts and DOS attacks occur outside of a company's network and may not be directly related to the company itself. As such, it is difficult to identify and address such issues from a company's vantage point.

Since such issues generally appear as routing instabilities or dramatic increases in latency or packet loss, intelligent route control solutions can easily identify and remedy the problems and the affected prefixes.



## Why Intelligent Route Control?

Intelligent route control systems mitigate risk by adding intelligence to multi-homed routing decisions. Intelligent route control devices take into account business objectives and service risks by maintaining routing policies and service demands as defined by an enterprise. The systems leverage redundant infrastructure, proactively measure service levels and alternate paths, and assert routing entries consistent with the proactive principles of business continuity. In addition to proactively addressing the risks involved in relying on the Internet, route control systems provide feedback in the form of performance, distribution and economic reports so that an enterprise may validate policies and further tune them.

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