

# Network Recovery when Disaster Strikes

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## Abstract

We can't prevent disasters, but we can help ensure that organizations and businesses are better prepared when disaster strikes!

Satellites at 36,000km above our heads are beyond the reach of disasters on the ground. Satellite earth stations can be fixed or portable, and used to automatically and rapidly recover critical communications links. While we have all seen a gradual displacement of satellite with fibre optics for primary communications circuits, many organizations are finding that satellite remains a viable and cost-effective solution to backup critical communications - a link to the sky right from their business premises. However the challenge in using satellite is the high cost of bandwidth - or is it?

This article looks at the current state of Network Recovery over satellite, exploring solutions for path protection, business continuity and disaster recovery (emergency communications restoration), and describes how organizations can benefit with the cost-effective assurance of protection over satellite for their mission-critical circuits.

## Disaster is Relative

Disasters can strike at any time, and statistics from various sources show the number has increased over the past 10 years. Whether caused by deliberate sabotage, natural events, accidents, infrastructure failures or even biological attacks; communications networks are at risk.

With increasing trade globalisation and development of e-commerce, our reliance upon communications networks continues to increase. Loss of mission-critical circuits disrupts business

services, upsetting customers, and can mean loss of income, loss of customers and potentially loss of life! As well as the primary telecoms service provider, businesses and organizations reliant on communications networks suffer credibility and potentially business survival, if adequate disaster recovery plans are not in place.

Headlines focus on major disasters but cable failures also have significant impact; such as the recent failure of the SEA-ME-WE-3 cable near Karachi, and subsequent fiber breaks off the coast of India and Pakistan, impacting Internet traffic in those countries as well as the UAE and Sri Lanka. "Call centres lose US clients due to service disruption, causing millions of dollars in losses and intangible damage, Pakistan Call Centres Association", IndiaTimes 3 July 2005. Statistics show the majority of faults in submarine cables occur at shallow depths (<100m) by fishing operations and ships dragging anchor ([www.scig.net](http://www.scig.net)). However regular, shorter period "brown-outs" that do not make the news, are plaguing business and organizations in many parts of Asia every day.

Even when redundant path cable is in place problems can occur, as seen recently in New Zealand when a rat was blamed for damage to one cable, while the other was hit by a post-hole digger. The resulting 5 hour outage on a busy Monday disrupted the stock exchange and other business between Auckland and Wellington. For those businesses wholly reliant upon communications, such failures seriously affect not only their operations, but can damage emerging industries bringing disastrous results.

## Satellite for Disaster Recovery

Communications circuits over satellite for recovery are typically either set up manually or are continuously provisioned. Manual provision usually involves a phone-call to a satellite service provider to allocate bandwidth, satellite equipment at each end of the link to

be configured, and circuit transmission re-routed. The time to get service back on line is variable, being difficult to achieve in less than 30 minutes and more often takes several hours. This is often too long to maintain the high-availability service demanded by customers for transmission of their mission-critical data. Continuous provision of satellite bandwidth for recovery purposes is an option, but typically cost-prohibitive for all except the largest telcos where there is no other option.

**Automated Disaster Recovery over Satellite - Today's Recovery Solution**

An automated disaster recovery service makes available a 'pool' of satellite bandwidth for recovery, and uses satellite's natural advantage of wide coverage area to share the bandwidth pool amongst many geographically separate circuits. Bandwidth is then made available when needed to serve a recovery event. A service based on this principle need cost only a fraction of full-time bandwidth cost, and bandwidth is paid for as used.

An automated Network Recovery service provides a seamless and cost-effective method for failsafe recovery of critical circuits over satellite when key communication links such as those using landlines, submarine cables and satellite systems are lost. An effective protection against the threat of network failure, it actively monitors customer's primary circuits for service interruption, and automatically establishes a satellite link when required.

**Path Protection over Satellite**

Telecoms carriers, cellular phone operators, internet and data service providers are under continual pressure to provide high-availability networks. In many cases provision of redundancy is mandatory for maintaining service license or necessary to remain competitive.

**Example - Automatic Protection over Satellite for Cellular Network Operator**

The aggressive build-out of cellular networks in Asia brings challenges to always provide the path protection required for a high-availability cellular phone service. It may be that new BSC sites do not yet have redundant ring protection. The problem faced by many cellular operators is to address both the need for rapid network

expansion and the need to provide network backup.

Many cellular operators are already familiar with using satellite to link remote Base Transceivers (BTS) or Base Station Controllers (BSC) for first and rapid deployment to areas where the terrestrial network is not mature. As terrestrial networks build out, replacing satellite with fiber or wireless, existing investment in satellite network equipment and bandwidth is repurposed to provide protection over satellite for critical BSC to MSC (Master Station Controller) links, while managing BSC to BTS links to optimise bandwidth usage.

Benefits for cellular operators:

- Add value to existing investment
- No extra bandwidth needed
- Proceed with rapid network expansion with the peace-of-mind of a recovery path over satellite for critical circuits.

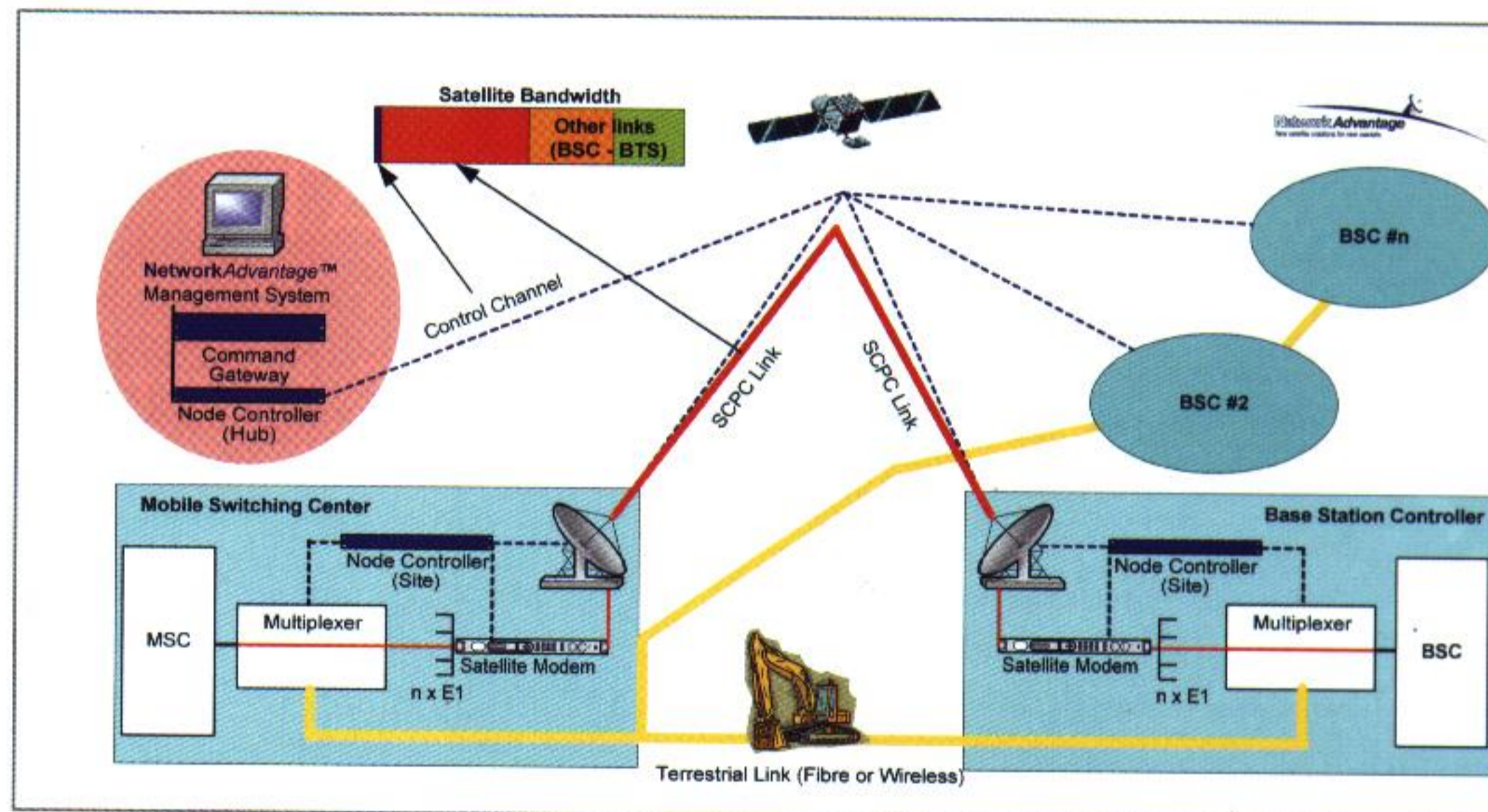


Figure 1 Automatic Protection over Satellite for Cellular Network Operator: MSC to BSC

Business cases show that the cost to add automated bandwidth management is recovered very quickly by lower operational (bandwidth) costs, compared with alternative satellite recovery methods. Table 1 compares the use of full-time (24x7), manual and automated satellite recovery methods.

	Operational Cost	Recovery Cost (Bandwidth)	Protection Speed	Protection	Bandwidth Management
Full Time Satellite	Medium	High	Seconds	Minimal (Signaling only)	Fixed links only
Manual	Medium	Medium	Hours	Minimal (Signaling only)	Shared Bandwidth High cost reserve b/w Slow & manual Travel to remote sites
Automatic	Medium (Add NMS)	Low	Seconds	Signaling+ Full circuit recovery	Shared Bandwidth Minimal reserve b/w Rapid & automatic (potential) Link priority Remote link control

Table 1 - Comparison of Satellite Path Protection Methods

Automatic recovery combines the advantage of allocating bandwidth only as required, along with rapid recovery that minimizes the impact on the end customer, protecting customer revenue and avoiding lost customers due to network reliability. Bandwidth management allows critical circuits (e.g. an E1 for signaling) to be restored, but also larger bandwidth links to be set up if spare bandwidth is available, restoring normal transmission to maintain call revenue. As recovery is very rapid (within seconds), with no skilled human intervention required, less reserve bandwidth is required than for manually provisioned recovery, significantly lowering operating costs.

## Recovery of Satellite with Satellite!

While communications satellites are designed for extremely high reliability, problems can occur from time to time. Path protection for remote sites where satellite is the only communications life-line can be provided at relatively low expense. With a disaster recovery plan and remote management capability in place, service can be restored to an alternate satellite within a few minutes, without having to send skilled engineers to re-tune satellite equipment.

Solutions are available for single antenna installations, as illustrated in figure 2, where the antenna is manually re-pointed to a pre-set position and satellite modems retuned remotely by the network command center to the new frequency assignment. If a second antenna pointed at an alternate satellite is available, recovery may be automated to restore links within seconds.

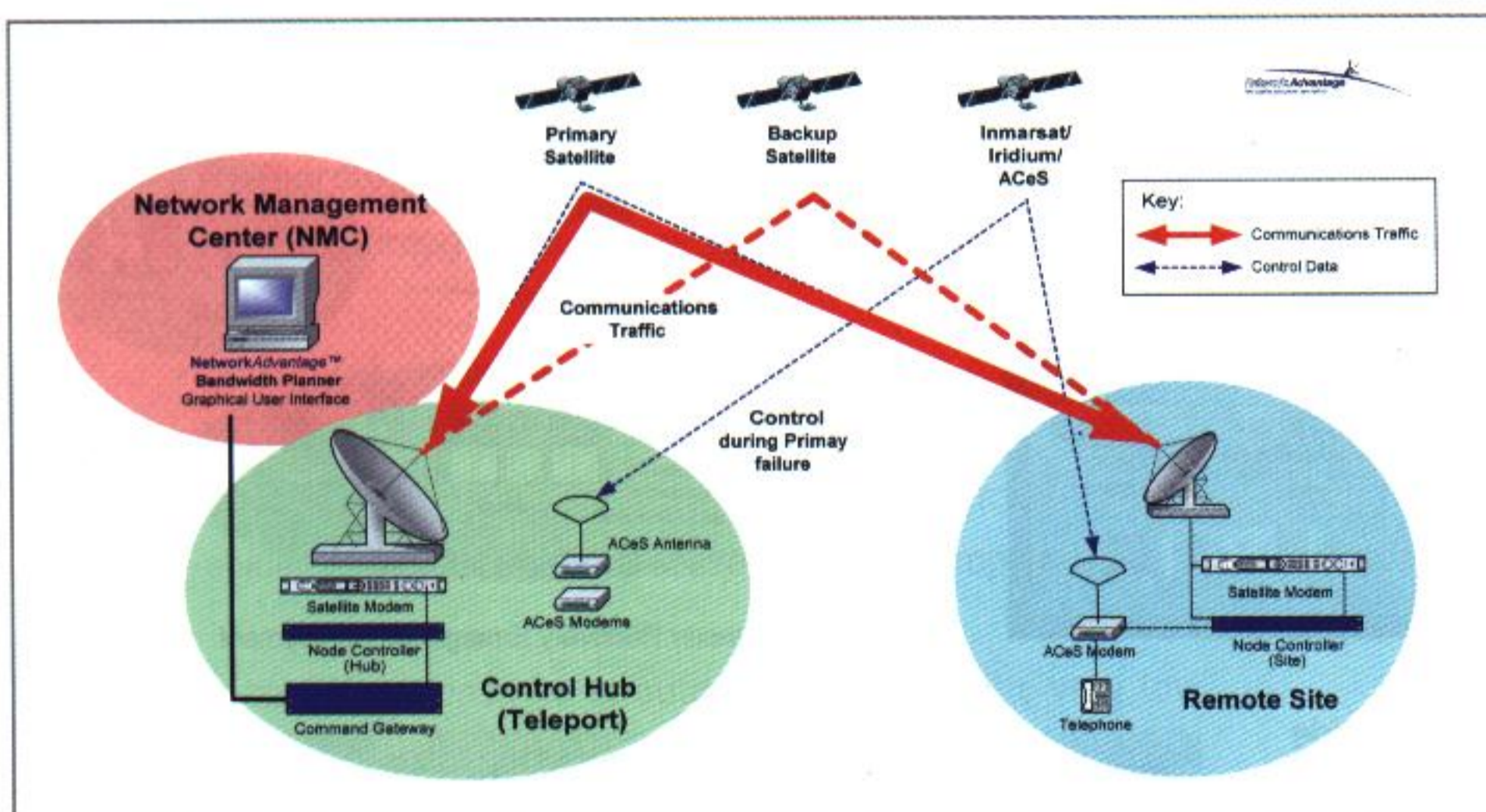


Figure 2 Satellite Protection of Satellite - One Solution

### Example: Protection in the Pacific

If you were at the PTC'05 conference in Hawaii last January, you will have witnessed the effects of a satellite loss in the Pacific when Intelsat's IS-804 satellite failed. Capacity was found and service was eventually restored on alternate satellites in the region. However the time taken and major disruption to business, government and

private communications in the Pacific region has forced a review of network recovery plans, particularly for those Islands and locations where satellite is the only communications life-line.

Working with the Pacific Islands Telecommunications Association (PITA) and Intelsat, Telecom New Zealand International have proposed a new managed communications service in the Pacific using the Intelsat replacement satellite IS-605 at 174° E. The managed service provides flexible access to discounted space segment on the inclined orbit satellite for capacity expansion, while providing rapid and automated recovery of critical circuits in the event of failure of the primary satellite.

Business cases for small Islands, such as Niue, are proving that addition of a second antenna on IS-605 and access to discounted space segment, is a more cost-effective option to extend capacity than an upgrade of the existing earth station - while bringing peace-of-mind of protection, using a natural alternative path for life-line communications recovery.

## Business Continuity

Loss of telecoms service, whether domestic or international, is a problem for many businesses and organizations within Asia. Call centres, Business Process Outsourcing (BPOs) companies, banks and finance companies, manufacturing, NGOs and government agencies all require high availability communications to meet their required level of Quality of Service, maintain revenue streams and avoid punitive penalties for non-performance.

Acting as insurance against disasters, an automated disaster recovery service assists customers recover rapidly and automatically when disaster strikes. Tailored to customer's specific network needs and bandwidth requirements, the service typically provides a backup to primary circuits direct from their premises, for example a satellite dish located on the rooftop.

### Example: SingTel's Automatic Network Disaster Recovery Service

SingTel have recently launched such a service based from their Bukit Timah earth station in Singapore. SingTel's service provides cost-effective backup over satellite, supporting bandwidth from 64 kbps onwards. Actively monitoring customer's primary circuits for interruption, the service automatically establishes a satellite link when required. Fees are charged according to bandwidth actually used when called on for disaster recovery, plus a monthly reservation fee.

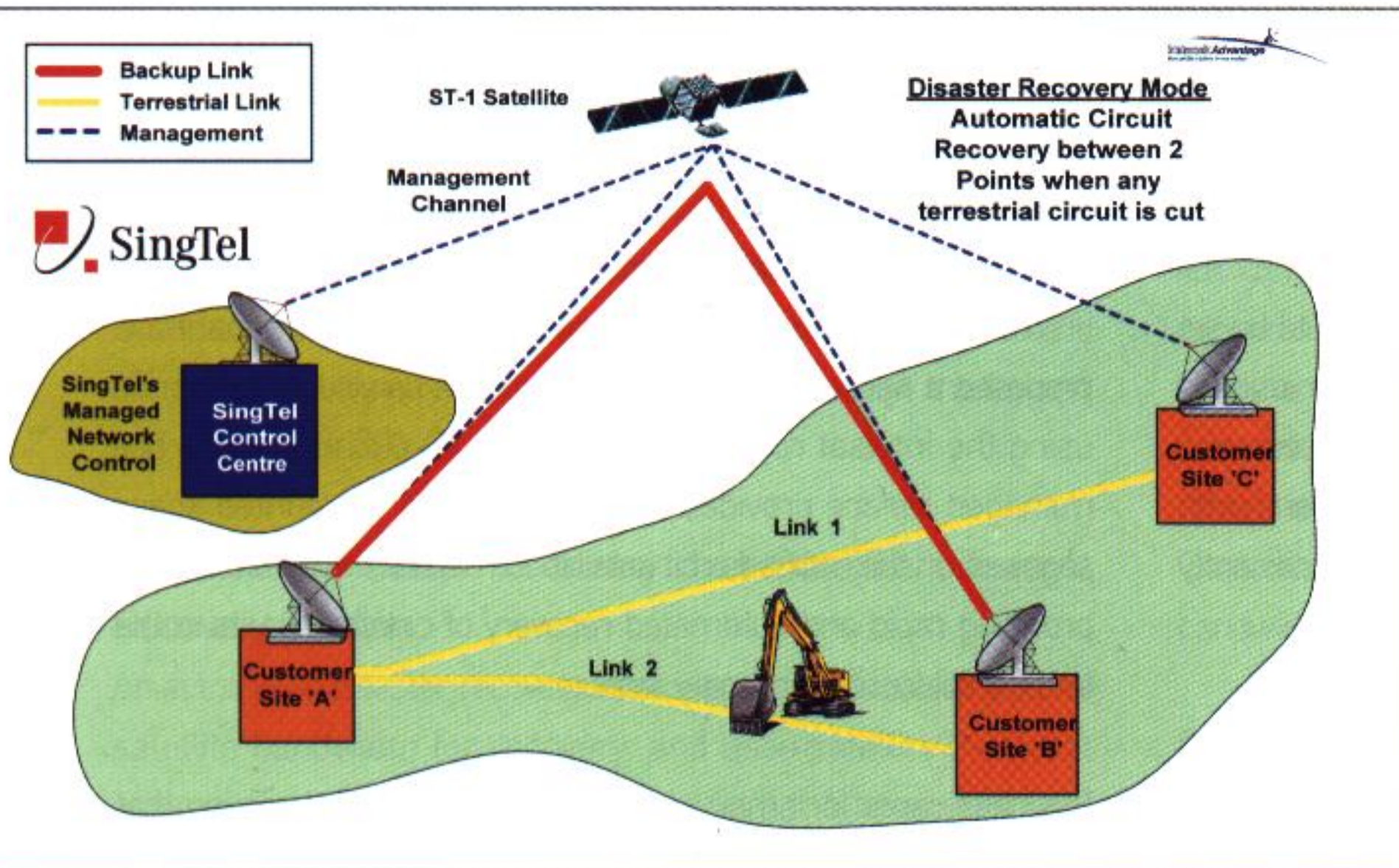


Figure 3: SingTel's Automated Network Disaster Recovery Service

From SingTel's 24x7 network management centre, network control manages backup of customer's mission-critical circuits between any customer location within a country or between countries, and within the footprint over Asia of SingTel's ST-1 satellite at 88° E. Service is provided on either Ku or C Band, and can be made available on SingTel's other satellite assets upon request.

## Disaster Recovery

When disaster strikes, communications into the affected areas are often interrupted or totally lost. Telecom service providers are called upon to provide rapid deployment of communications in disaster regions to aid relief efforts.

Satellite access combined with wireless point-to-multipoint systems provide a very effective solution to rapidly set up an emergency communications network. The rapid deployment terminal is established at a suitable location within the affected area and linked back via satellite to an unaffected local or regional telephone exchange. Wireless extensions to hospitals, sanctuaries and relief outposts can be quickly set up to provide quality telephone, fax and data connections.

A range of equipment is available to assemble rapid deployment terminals. The example in figure 4 illustrates a very cost-effective and self-contained system. A fly-away or suitcase satellite terminal and satellite link can be quickly set up, with additional bandwidth easily provisioned as needed. The CDMA wireless base station is configured for 2.4 or 5.8 GHz operation (license free in many

countries) and quick-deploy radio mast erected. As electric power is often not available or unreliable, the terminal is supported with a generator or optionally battery and solar power.

Remote field terminals are quickly established with a small antenna and terminal providing several lines for telephone, fax and data modem. Up to 1024 subscribers over a radius up to 96 km may be supported with high quality communications in a disaster hit region.

### Be Prepared!

As disaster can strike at any time, anywhere and in any form, it is prudent to be prepared,

and extremely risky not to have an adequate disaster recovery plan in place. Satellite is naturally suited to provide recovery for path protection, business continuity and emergency deployment in disaster hit areas, and to play a significant part in disaster recovery planning for service providers, businesses and relief organizations. Free from terrestrial interference, an automated and rapid Network Disaster Recovery service over satellite manages resources efficiently, providing cost effective insurance in preparation for when disaster strikes. 🌐

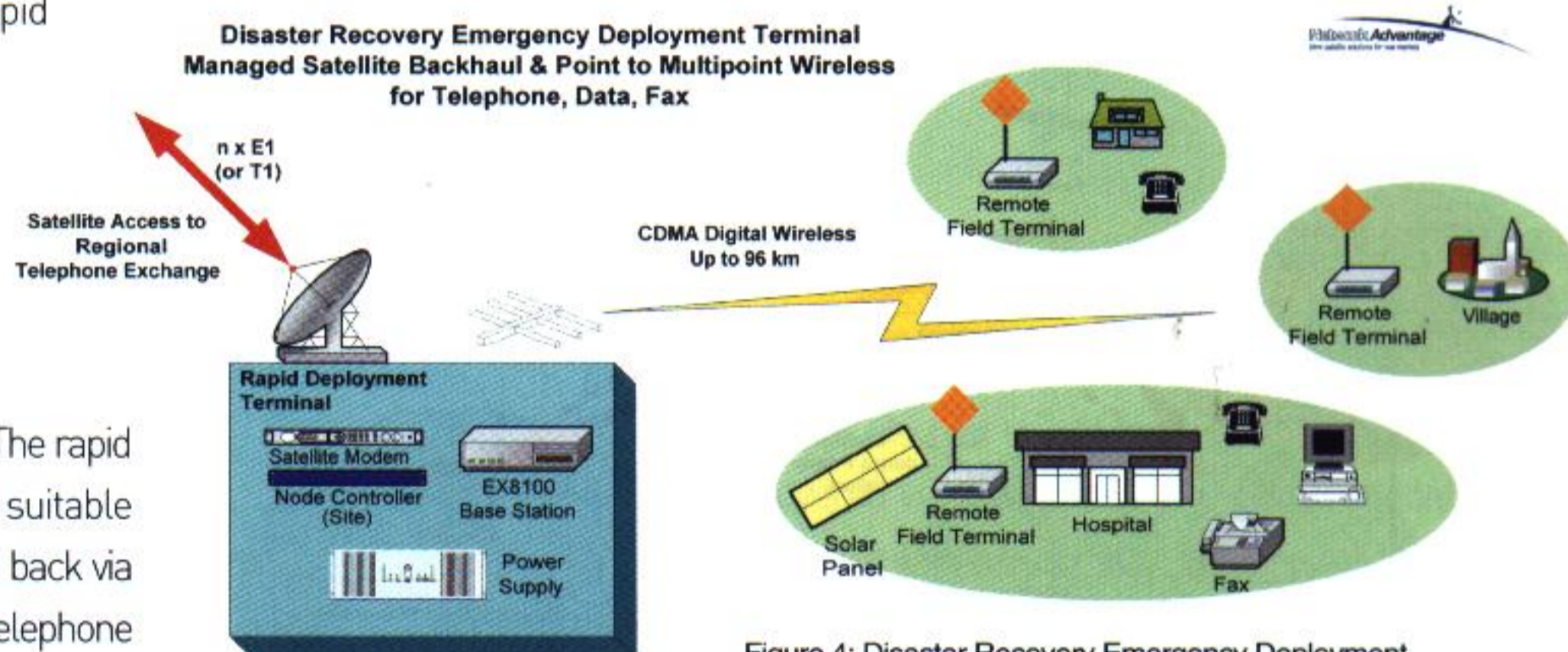


Figure 4: Disaster Recovery Emergency Deployment



**Michael Elwood-Smith** leads the NetworkAdvantage™ team based in Wellington, New Zealand, developing satellite network management solutions for use in disaster recovery. Michael's background encompasses senior positions and experience in satellite & telecommunications including Senior Vice President of Product Management at the Fantastic Corporation (Switzerland), Business/Technology Advisory Consultant for GOA AG (Switzerland), Director of Applications Engineering for Scientific Atlanta Europe (UK), and Transmission Engineer, Telecom New Zealand.