Chapter 9
Reach to Mobile Platforms and Availability:
A Planning Tutorial

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ABSTRACT

This chapter is practical system planning tutorial for internetworks that include radio-WANs. Author is retired USCG officer with both operational and program planning experience. In second career, author taught 'plowshares into swords internetworking' at the graduate level. The coaching herein reflects operational, planning, and academic experiences. Considering mobile communications requires adjusting some assumptions and working knowledge from a wholly wired internetwork. The advent of radio – the necessary means to mobile – entails changes in topology, capacity and nature of the media (shared). Further, the extension of the internetwork to mobile usually means rather overt embracing of mission critical applications.

INTRODUCTION

It was a dark, stormy and windy night. The weather service had forecast the 100 knot windstorm correctly and the fishing fleet had all scampered for port and were getting safely tied up. Except for one trawler, with a crew of three, who, as it turned out, pushed luck about an hour too far. As the wind built the Coast Guard established a communications watch, which meant radioing the fishing boat crew every half hour. Further, as the

storm built, most of the crews at the lifeboat stations and air station had returned to duty, whether expressly called or not.

As the storm built further, trees started falling and electrical power went out for large swathes of the Oregon coast. The fishing boat was making maddeningly slow progress toward Cape Arago and safety in its lee.

As the windstorm peaked, the fishing boat skipper called the Coast Guard and said that he could make no further progress into the wind and

had turned around. Heading downwind meant out to sea and in the Pacific that means a really long ways to the next landfall. This electrified the Coast Guard: Coos Bay lifeboat station launched two motor lifeboats and North Bend Air Station launched a helicopter.

The search ended up being fruitless – the fishing vessel was never seen or heard from again. The helicopter only found the two motor lifeboats on scene. After a first search, hampered by darkness and the storm, we decided to recall forces and prepare for a thorough first-light search which was about five hours hence.

On the way back to the air station, the helicopter's engine failed and the pilot auto-rotated into the Pacific Ocean just offshore. The three-man crew exited the aircraft safely but the copilot drowned. The other two crew were washed up on the beach shortly before sunrise.

When the helicopter's engine failed, the pilot radioed a Mayday. Ten miles away, in the operations center (where the author was standing), we did not hear it. The communications system had failed.

Incident Evaluation

As this author unraveled the communications system problems, three stages of events showed.

The third, but immediate observation was that the existing equipment had been maintained properly. Indeed, the immediate failure cause was grid power failure and once electrical power returned, the communications system returned.

The second stage was that the system was inadequately provisioned with backups, especially backup power but also alternate routes. The principles of high availability engineering had not been observed.

But the engineers who deployed the system are not really to blame: the program sponsor had never specified a required level of availability. The first or root problem: the system was never acknowledged as mission critical. The requirements statement simply had no stated availability requirement.

Attending funerals is a graphic and convincing way to learn availability lessons but it's not the recommended approach. This chapter turns the problem around and addresses it in the above logical, albeit not chronological, order.

IMPACTS OF REACH TO MOBILE PLATFORMS

Considering mobile communications requires adjusting some assumptions and working knowledge from a wholly wired internetwork. The advent of radio – the necessary means to mobile – entails changes in topology, capacity and nature of the media (shared). Further, the extension of the internetwork to mobile usually means rather overt embracing of mission critical applications.

- **Topology**. The 'traditional' internet is made up of backbone wide area networks (hereafter terrestrial-WAN) and local area networks (LAN. Both wired and wireless LAN fall in this category). The terrestrial-WAN is largely made up of point-to-point cabling (predominately fiber optic) and can be described as interconnecting a fabric of routers. There are no end systems in this fabric – it's all router-to-router interconnect. The connectionless, stateless nature of Internet Protocol affords this terrestrial-WAN a great deal of modularity – new links can be added transparently and capacity mismatches from one hop to the next are not important to route-ability and hence interoperability. The routing protocols and supporting 'hello' messages find these new links and add them to the routing table. All of this is transparent to the user and allows the terrestrial WAN to grow in capacity and number of links.

As depicted in Figure 1, LANs are the reach from the last router to end systems and are the part of the infrastructure visible to the user. LANs, of course, come in wired and wireless variations.

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