



A world of ... words!

The odd couple

Satellites and the Internet: Challenges and Solutions, D C Palter, SatNews Publishers, 2003, 228pp, \$45.00 [softback], ISBN 0-93636136-0

▶▶ To state that the Internet is important in today's world is a bit like suggesting that air is useful for breathing. Although most of us have been using the Internet for less than a decade, we wonder how we ever managed without it. However, relatively few people consider the implications of satellites for Internet communications, a subject addressed by this compact volume.

According to the author, with the growth of the Internet, email and web-based communications by consumers, businesses and governments has quickly become a larger consumer of bandwidth than telephony. And now, of course, even voice traffic is migrating to the ubiquitous Internet Protocol (IP). This has created "an important new market for communications satellites", he says, especially for links across the globe where terrestrial infrastructure is "unavailable or uneconomical".

Unfortunately, several aspects of satellite operation are not well suited to what has become the *de facto* standard for computer networking via the Internet: transmission control protocol (usually combined with IP as TCP/IP). The most important are the signal delay resulting from the satellite's position in geostationary orbit (about 0.12s on the uplink and another 0.12s on the downlink); the relatively high bit error rate typical of satellite networks; and the asymmetrical bandwidth requirements related to huge website downloads. These disadvantages have prompted many of those with vested interest in terrestrial networks to dismiss satellites as 'unworkable' for Internet applications. A key message of this book, in response, is that solutions are available to meet this challenge and allow satellites to compete with terres-

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trial alternatives.

Though not designed as a comprehensive text on TCP/IP for protocol experts, the book provides a guide to computer networking with sufficient technical information to allow the reader to understand how the protocols work. It does this by dividing the text into three sections: a primer on the fundamentals of computer networking; the interaction between TCP and satellite

link conditions; and a review of the solutions designed to overcome performance limitations.

For example, the extra half-second involved in sending a message and receiving a reply via satellite - the same delay that makes TV news correspondents look slow in answering questions from the studio - is only a problem because of the design of TCP. The delay causes the protocol to mistakenly believe that bandwidth is not available or that the link is congested, says the author, thereby preventing TCP from using the full bandwidth.

The solutions include modifications to TCP/IP itself, alternative specialised satellite protocols, compression techniques and 'spoofing' (which the author describes as 'fake TCP acknowledgements formatted to make the sender believe that [they] came from the actual destination device').

For those content in the reassurance that satellites have not suddenly been made redundant by the rise of the Internet, this is probably sufficient information, but for those who need to know the detail there is plenty in the book. Its coverage is divided into short chapters with numbered subdivisions, which make it easy to assimilate, and each chapter ends with a summary and a list of (mostly web) references. The book



places the details not only within a general technical framework, which applies as much to terrestrial as satellite communications, but also within an historical context. We learn, for example, not only what TCP is and how it works, but where it came from. An unfortunate assumption from the beginning, however, is that

everyone knows what TCP stands for. It is spelled out on page 89, for example, but that's a bit late. The same is true of other, less well known abbreviations, and an appendix listing them would have helped the novice reader. Despite this omission, this book is a timely and useful addition to the Internet-related literature. ■

Just give it time

Global Mobile Satellite Systems: A Systems Overview, Peter A Swan & Carrie L Devieux Jr (Editors), Kluwer Academic Publishers, 2003, 170pp, Euro 112, \$110.00, £77.00 [hardback], ISBN 1-40207384-4

▶▶ What will historians of technology recall about the 1990s? Certainly the development of the Internet, and probably the phenomenal rise in popularity of the mobile phone. But what about the introduction of the satellite phone, the 'Star Trek communicator' of the twentieth century?

Today, it seems unlikely that it will warrant much more than a paragraph, or possibly a couple of footnotes in the broad sweep of mobile communications technology, since few outside the satellite industry remember Iridium, Globalstar and the other satellite systems collectively known as Global Mobile Satellite Systems (GMSS). This would be a shame...and a disservice to the glorious history of telecommunications.

Those who do remember the name Iridium will know it as a constellation of satellites in Low Earth Orbit (LEO) that failed to meet the expectations of its marketing plan and ended up in Chapter 11 bankruptcy proceedings (a provision of US bankruptcy legislation which allows a company to restructure its debt and attempt to continue trading). The key problem was the cost of the system - some \$4.3 billion including ground segment and financing costs - which required an awful lot of telephone calls to be made before the red ink turned to black. Additional problems were the size and weight of the handsets, high airtime costs and a defective marketing plan. The financial community's resultant wariness of satellite projects, whether technically risky or not, was termed the 'Iridium Effect'.

But this is only one side of the story. When that history of late twentieth century telecommunications is written, this book should feature as a reference, since it provides a counterpoint of technical excellence. Iridium, for example, was an outstanding engineering success in terms of design, manufacturing, deployment and operation of the constellation. Between May 1997 and May 1998, the Iridium consortium launched a total of 72 satellites (66 + 6 spares) on 15 separate launchers - an unprecedented launch rate - and declared the system operational in November 1998. As a result of the constellations, satellite manufacturing

took a step towards mass-production that was considered impossible only ten years earlier.

The book covers other GMSS examples in what its editors call "the big picture sense" with a top level overview - covering market demand, business trade-offs, regulatory issues and technical considerations - followed by more detailed analyses. "The objective of this book", they say, "is to make mobile satellite communications understandable [for] decision makers, engineering managers, regulators, financiers, engineers and technicians".

Beginning with the basics of GMSS, it quickly moves on to the system architectures, market demand and spectrum considerations which set the foundation for system design, while other chapters concentrate on communications fundamentals. At only 170 pages, including a short index, this is a small book with little room for technical detail or side discussions, but that is the way with overviews.

On the positive side, this would be an excellent primer for a young engineer tasked with the design of a future mobile satellite system. On the negative side, the book appears to have been published ten years too late...or perhaps ten years too soon. The editors are convinced of the 'rightness' of the GMSS approach and appear to believe that its time has yet to come. "One of the key lessons learned over the years," they write in their conclusion, "is that the proper approach, the proper motivation and the right ingredients do not always lead to the success expected". They cite, as examples, the time it took commercial airlines, rail systems and the Panama Canal to become successful. "The eventual success of the GMSS concept will surface as time progresses", they conclude hopefully.

Will history record GMSS as a technology ahead of its time, a technology whose time has yet to come...or as the Betamax of the satellite world and past its sell-by date? Only time will tell. ■

