



PTC2002

Next Generation Communications: Making IT Work

Broadband Data Communications Via Satellite  
[Networks and Methodology]

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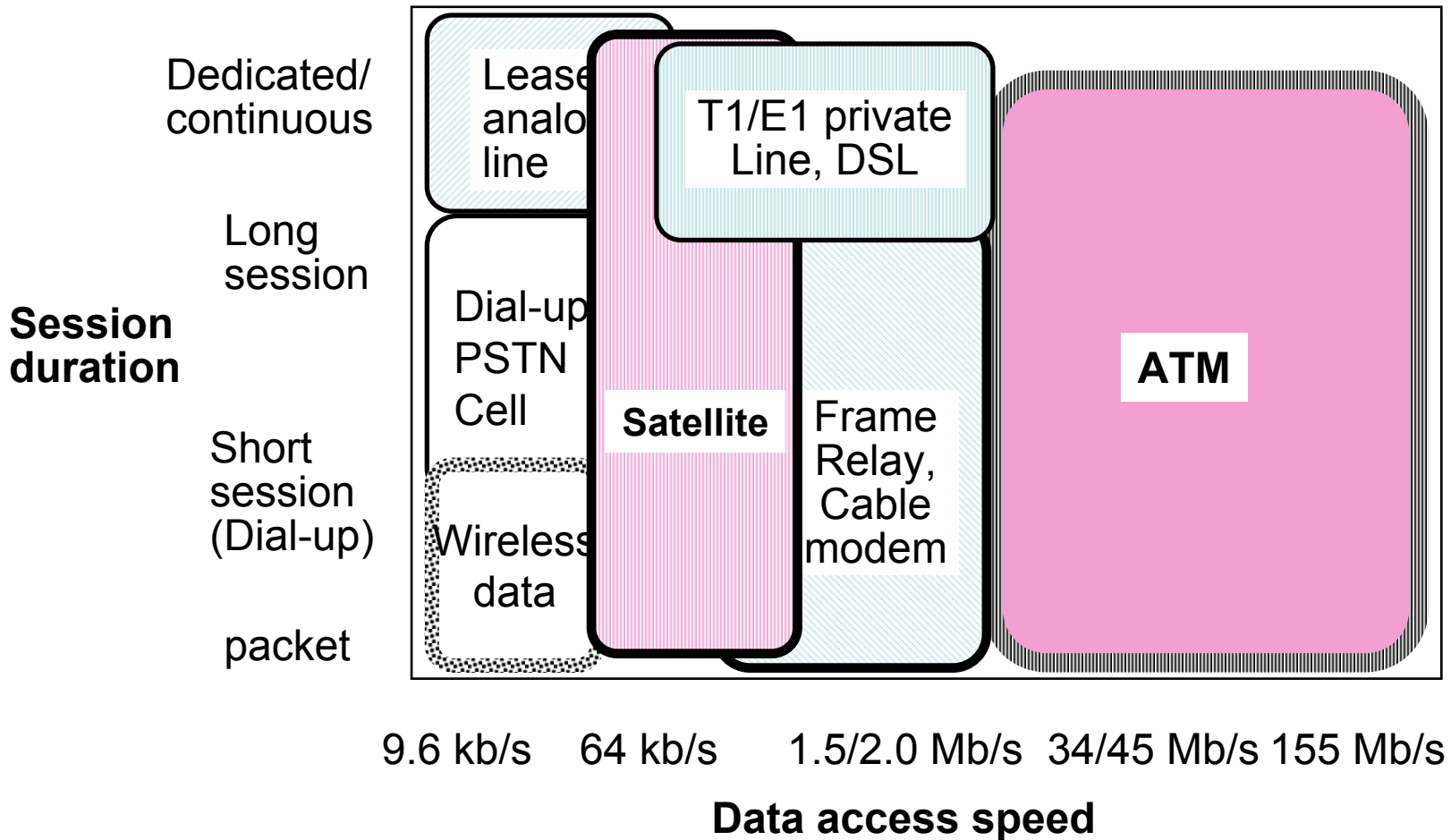


# Satellite Broadband Today

- Historically, VSAT networks offer an alternative to low to medium speed leased-line networks
- Broadband innovation came in the form of MPEG-2 and Digital Video Broadcast (DVB)
- New generation of VSAT equipment and high-performance geostationary satellites capture the benefits of broadband satellite communications
- Selection of satellite and equipment vendor remains a challenge



# Differences Among Data Communications Services



# Planned GEO Broadband Systems at Ka Band

Name	Owner	Spacecraft builder	Quan	Cost, US\$ B	Date
<b>Astrolink</b>	Lockheed–Martin, TRW, Telespazio, Liberty Media	Lockheed–Martin, TRW	9	\$8.1	2003 (?)
<b>WildBlue</b>	WildBlue	SS/Loral (Boeing for Anik F2)	2	\$0.75	2002
<b>Spaceway</b>	Hughes Electronics (Hughes Network Systems)	Boeing Satellite Systems	8	\$5.1	2002 (?)
WEST	Astrium	Astrium	2	\$1.64	2003/2004



# Compiling Bandwidth and Service Requirements

<b>User application</b>	<b>Network Interface</b>	<b>Satellite Network Technology</b>
<b>Internet access</b>	<b>Public Internet, Internet Protocol</b>	<b>Broadcast (DVB-S)</b>
		<b>Return channel</b>
<b>Access to corporate Intranet</b>	<b>Private network infrastructure</b>	<b>DVB-S</b>
		<b>Return channel</b>
<b>Content distribution</b>	<b>UDP/IP and Multicast</b>	<b>DVB-S</b>
<b>Video teleconferencing</b>	<b>H.320 or H.323 standards</b>	<b>Star or Mesh</b>
<b>Telephone</b>	<b>POTS or VoIP standards</b>	<b>Star or Mesh</b>
<b>Leased line</b>	<b>T1/E1</b>	<b>Mesh network</b>



# Satellite Selection Criteria

- Appropriate frequency band and adequate bandwidth
- Suitable geographic coverage from the satellite footprint
- Adequate performance in terms of effective radiated power (EIRP) and receive sensitivity (factors best evaluated with the link budgeting techniques)
- Satisfactory on-orbit reliability, as demonstrated by design and past performance
- Sufficient lifetime or appropriate arrangements for replacement of the capacity
- Non-technical criteria and pricing

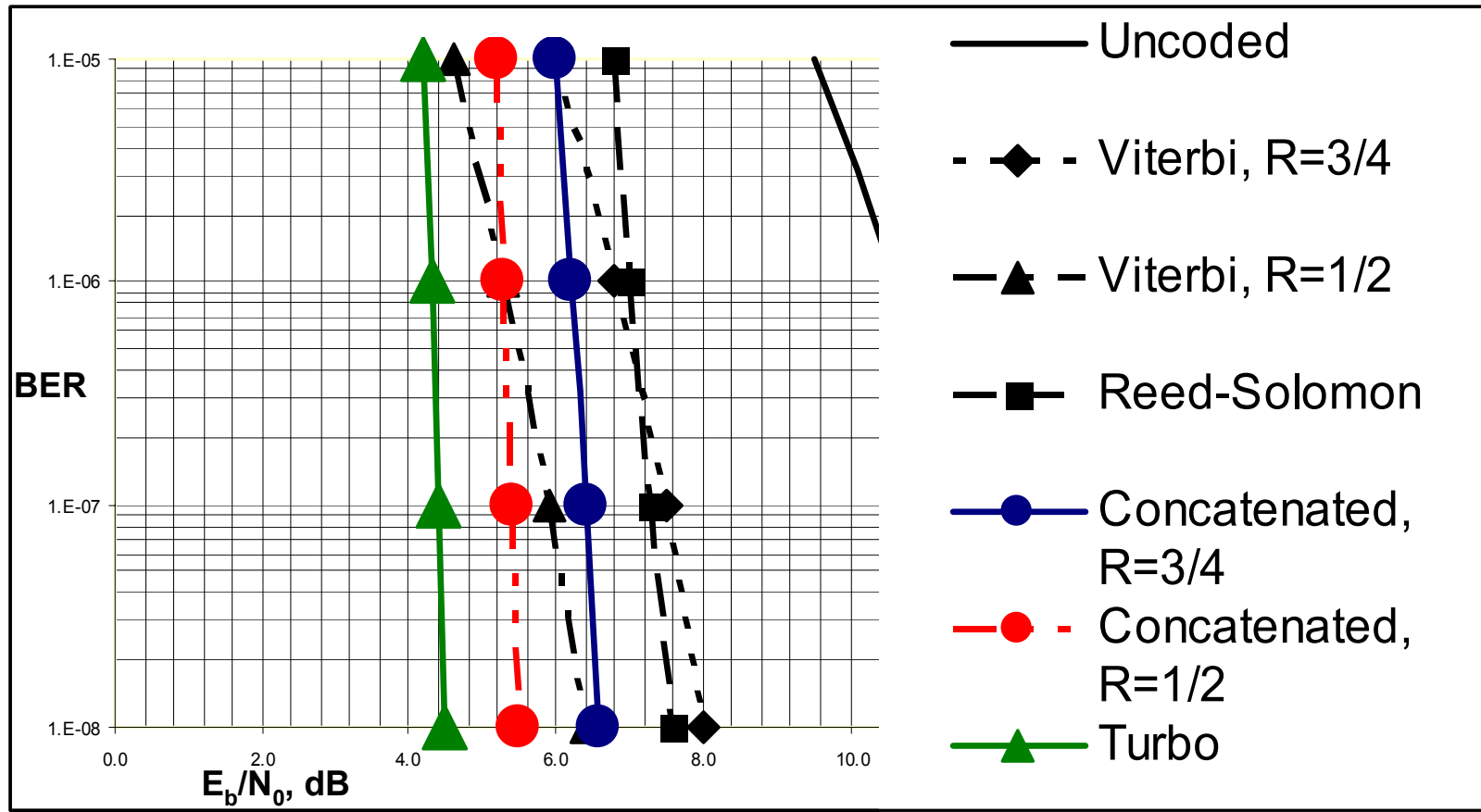


# Comparing VSAT Suppliers

<b>Hughes Network Systems</b>	<b>Full range of VSAT and wireless products</b>	<b>PES, TES</b>	<b>Proprietary, TDMA</b>
<b>Gilat Satellite</b>	<b>Full range of VSAT and wireless products</b>	<b>SkyStar Advantage, SkyBlaster</b>	<b>Proprietary and DVB, TDMA</b>
<b>ViaSat</b>	<b>VSAT products</b>	<b>LinkStar, ArcLight</b>	<b>Proprietary and DVB, TDMA and CDMA</b>
<b>STM Wireless</b>	<b>Full range of VSAT and wireless products</b>	<b>Broadband</b>	<b>Proprietary and DVB, TDMA</b>
<b>Shiron</b>	<b>Interactive VSAT product line</b>	<b>InterSKY</b>	<b>Proprietary and DVB, FDMA</b>
<b>iDirect</b>	<b>Interactive VSAT product line</b>	<b>Netmodem II</b>	<b>Proprietary, IP-based</b>



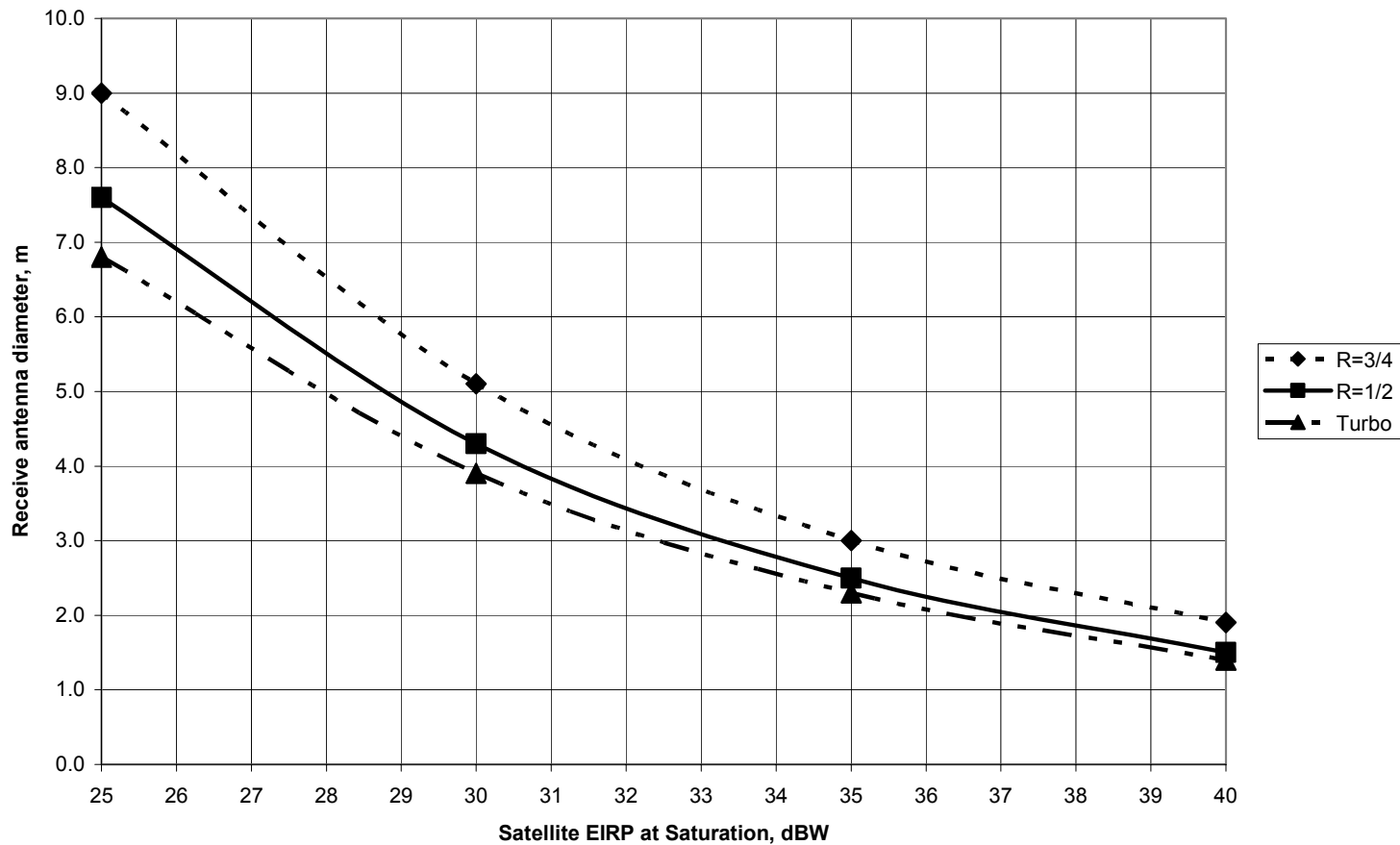
# Technical Comparison Criteria (Typical $E_b/N_0$ Performance)



# Impact on Dish Size – C-band

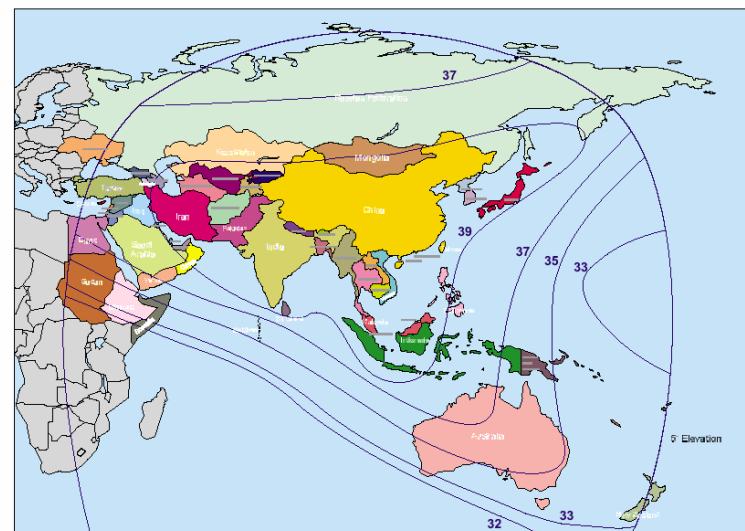
## Antenna sizing for receiver in Manila

33° elevation angle, ITU rain 110.9 mm/hr



# Transmitter Size

Paramter	Units	
<b>Data rate</b>	<b>kbps</b>	<b>256</b>
Eb/No	dB	
R=1/2 (without R-S)		6.4
Turbo		4.5
<b>Transponder capacity</b>	<b>channels</b>	
R=1/2 (without R-S)		<b>161</b>
Turbo		<b>225</b>



		Suva, Fiji	Manila, Phil	Palembang, Indon
SFD	dBW/m2	-80.0	-90.0	-88.9
G/T	dB/K	-12.0	-1.6	-2.9
R=1/2	<b>Tx power</b>	<b>30.7</b>	<b>3.6</b>	<b>3.0</b>
Turbo	<b>Tx power</b>	<b>22.0</b>	<b>2.6</b>	<b>1.9</b>



# Objectives of Development

- A clear definition and flowdown of service objectives, in terms of features and bandwidth.
- Adequate determination and allocation of quality objectives
- Identification of the satellite and network structure, and distribution of the ground elements of the system.
- Creating of a service management approach, using the hardware and software aspects of the architecture, adapted to the organization's needs and abilities.

**In all of this, consider test and evaluation throughout development.**





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# Thank you!

**Presentation slides at:  
[www.applicationstrategy.com/conference.htm](http://www.applicationstrategy.com/conference.htm)**

