

Interference Mitigation & Prevention

Pro-Active and Re-Active Solutions

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& Prevention Initiative
GVF

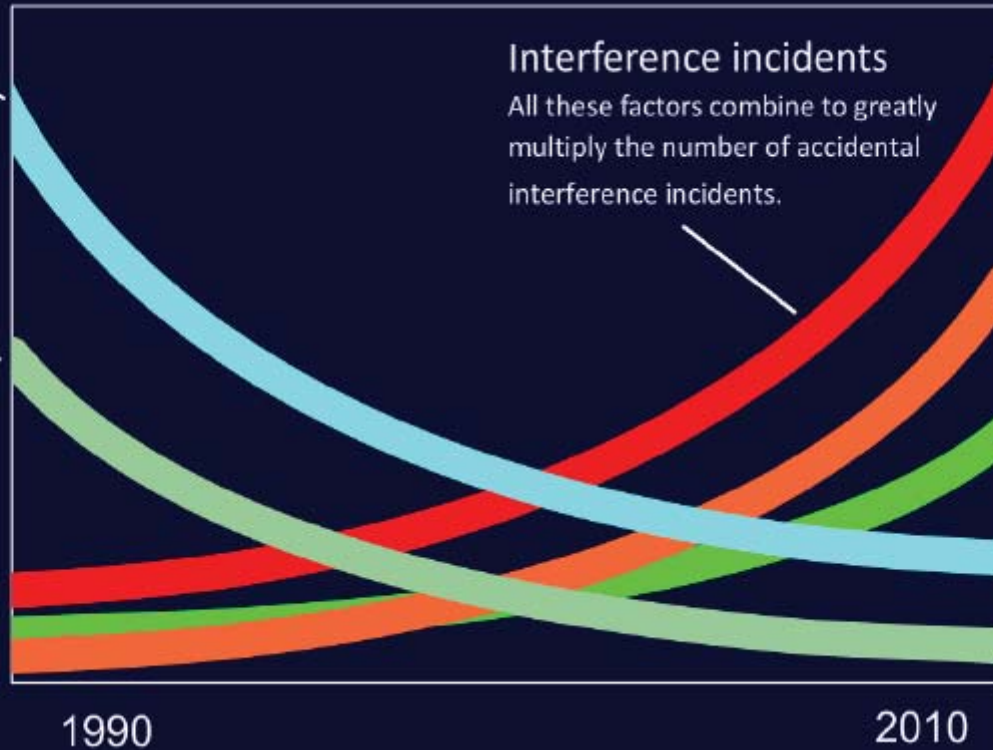
Why is Interference Increasing?

Hardware cost

With VSAT terminal costs dropping well below \$1000, the margin available for installation services is falling.

Installer fees

Years ago, an engineer might spend days on site running SSOG's. Now installers are often junior technicians and are paid as little as \$50 for a complete VSAT installation.



Interference incidents

All these factors combine to greatly multiply the number of accidental interference incidents.

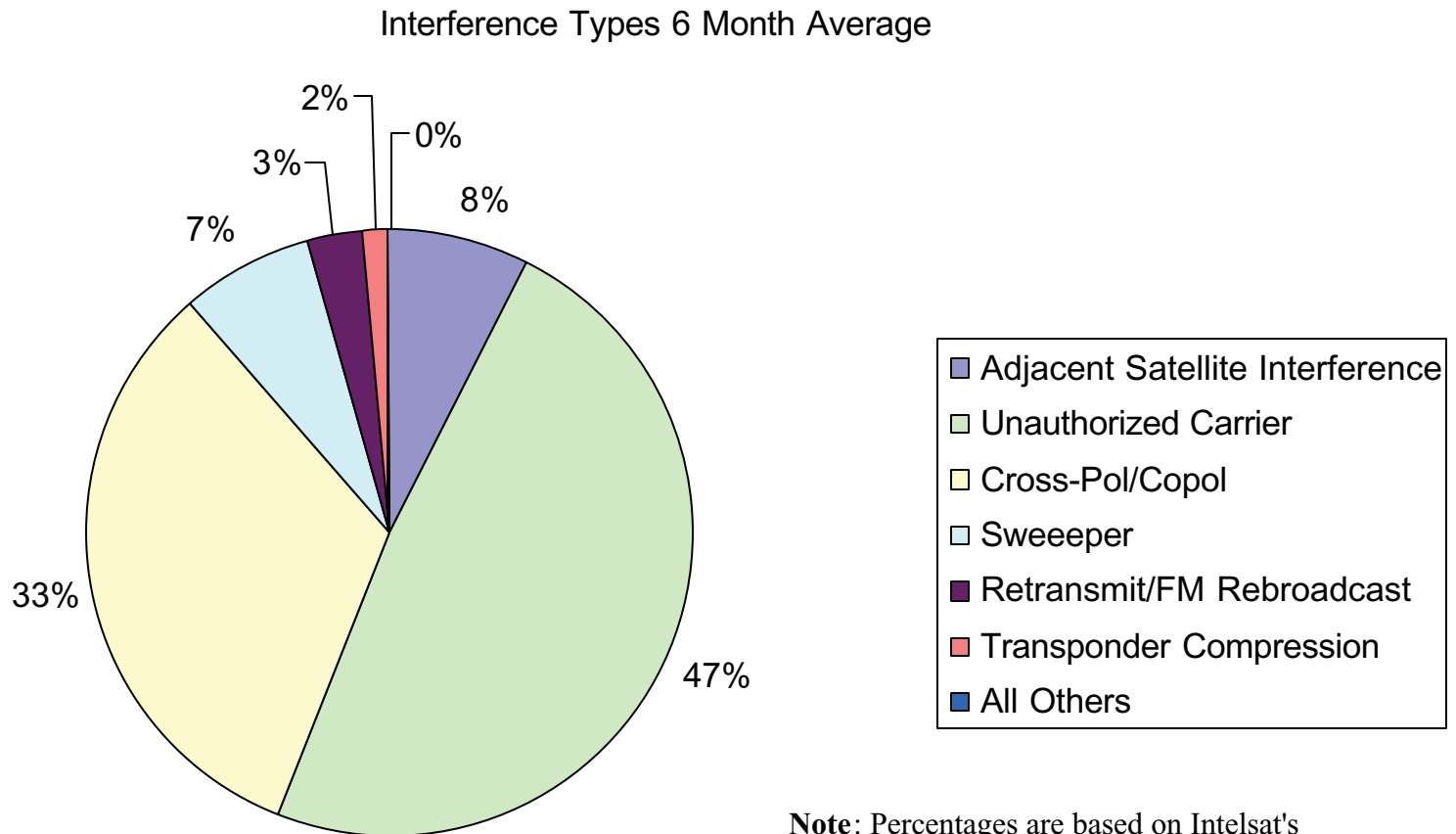
Deployments

Over 100,000 VSAT terminals installed per year. Any one can cause serious interference.

Satellite sensitivity

Spot beams make satellites more sensitive to uplink signals. That helps reduce VSAT size and cost, but it makes transponders more sensitive to interference.

Characterizing Interference Types



Note: Percentages are based on Intelsat's experience but are indicative of hundreds of interference events experienced by the world's satellite operators.

Satellite RFI: Breaking It Down

- Problems:

1. Improper Installations
2. Sub-Standard Equipment
3. Unidentified Carriers
4. Wireless Interference
5. Information Sharing
6. Disfunctional Networks

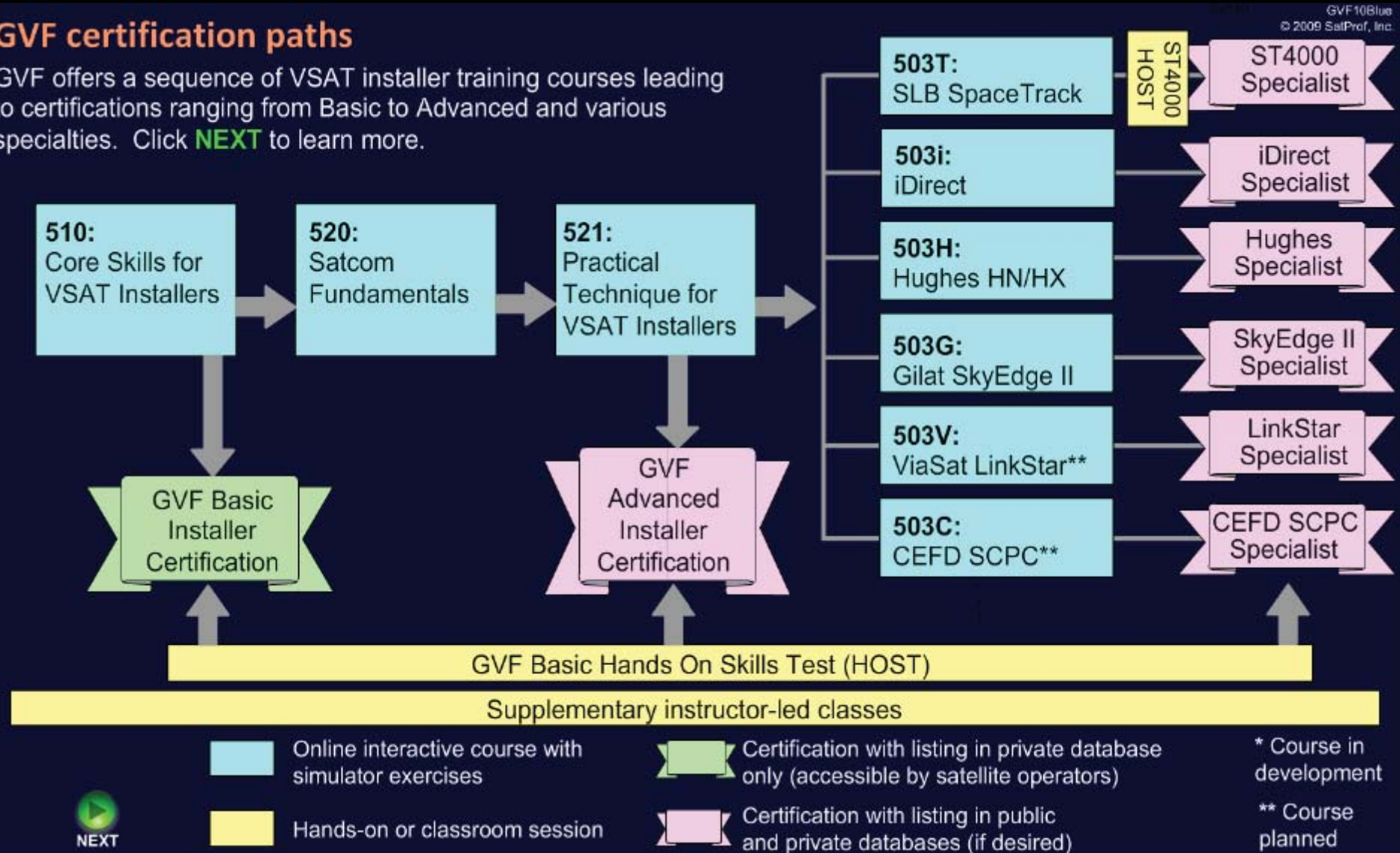
- Solutions:

- ✓ Training & Certification
- ✓ Product Quality Assurance
- ✓ Carrier ID
- ✓ Spectrum Initiative
- ✓ SDA
- ✓ Network Validation

Addressing Installations... and Operations

GVF certification paths

GVF offers a sequence of VSAT installer training courses leading to certifications ranging from Basic to Advanced and various specialties. Click **NEXT** to learn more.



Interactive Learning Example

Exercise: find and peak

In this exercise you must **find** the satellite and perform the initial **peak in azimuth and elevation**. You may assume the following:

Your location is **128 deg E, 30 deg N.**

The satellite is at **154 deg E.**

The VSAT will use **V** downlink polarization.

Pointing angles from your look angle calculator:

Azimuth = 135, Elevation = 44, Pol = 37

Remember your steps:

1. Preset the polarization. Use the Quick Reference Sheet to help make sure you are turning the right way.
2. Preset your elevation.
3. Scan coarse az to find the satellite. Step elevation up and down and scan az again if needed
4. Peak it with the el and fine az adjusters.
5. Lock the coarse azimuth but leave the fine az, el, and pol locks loose.

When you are ready (or if you need a hint), click the **SHOW MY RESULTS** button to see how well you did. If you are having trouble, click the **HELP** button.

? HELP

SHOW MY RESULTS

Pointing29
© 2009 SatProf, Inc.

Total power 74

ID signal 5.6

Signal ID Meter Gain

Compass
124

Viewpoint Look at:

+
-

 Show compass

Hands-On and Supplementary Classes

In addition to the required Hands On Skills Test, GVF instructors also teach supplementary, classroom or hands-on classes, according to their specialties.

Topics may include:

- ▶ Additional hands-on practice
- ▶ Advanced troubleshooting skills
- ▶ Specilaized equipment training
- ▶ Review and discussion of online courses in local language
- ▶ Engineering-level topics such as link budgets and RF system design.



NetHope class, Nairobi 2009

Global Training Status

- Approx. 4,200 Technicians Enrolled Worldwide
- Training Centres Established in Every Major World Region
- Translated into Spanish and Portuguese (French is Next)
- Dozens of Examiners and Instructors Worldwide
- Operators Moving Toward VSAT Certification Requirements
- New: Auto-Deploy Operator Certification Strategy

Sub-Standard Equipment Trends

- Increasing Attempts by Inexperienced Manufacturers to Try Production of Transmitting VSAT Antennas
- Designers often unaware of how accurately installers must align the antenna to prevent ASI and cross-pol interference
- Now, Auto-Deploy Is Being Added to the Mix
- Reduced Satellite Operator Provision of Type Approvals for VSAT Earth Station Equipment
- Vacuum in Technical Know-How and Deployment of Systems That Spray Orbital Arc with Interference

Product Quality Assurance

- GVF Now Provides Outsourced Type Approvals
- Intelsat and Eutelsat First to Embrace the Solution
- GVF 'Authorized Test Entities' Available to...
 - Assist Antenna Manufacturers with Design
 - Conduct Type Approval Testing
 - Using Satellite Operator Specs
 - Provide Type Approval for Compliant Systems
- **New: Global Product Quality Assurance Framework**

Is VSAT Carrier ID Part of the Solution?

- Video Encoder Implementation Underway
- Data Group Launched in '09
- GVF VSAT Group Launched in '09:
 - Includes VSAT Manufacturers, Satellite Operators, IRG, Detection Experts, Others
 - Scope & Principles Agreed
 - **New: Technical Feasibility Appears to be Established**
 - **Evaluating Next Steps: Root-Cause Analysis, Who Pays, Proprietary Considerations, etc.**

IMT/BWA in C-band Downlinks

**Is currently being introduced
country by country worldwide**

Was considered at ITU WRC-07



**Broadband Wireless Access
(BWA), WiMax, FWA,**

**Future mobile phone networks
(IMT Advanced, 4G,)**



Additional band

**(FSS, feederlinks
for MSS, ...)**

Band commonly used by FSS satellites

WiMAX Interference Sample

THE UNITED REPUBLIC OF TANZANIA
TANZANIA COMMUNICATIONS REGULATORY AUTHORITY

Telegram : TUMEWASILI, Dar Es Salaam
Telephone : 255 22 2118947-52
Fax : 255 22 2116664
Email: info@tcra.go.tz
Website: www.tcra.go.tz



P. O. Box 474
DAR ES SALAAM
TANZANIA

Ref: No: TCRA/R.12/INT/189

08/11/2006

Corporate Legal Counsel
GS Telecom (PTY) LTD
GS Telecom House, 68 Oak Avenue
Highveld Techno Park, Centurion

FAX: +27 012 665 1079

RE: Complaint on C-Band Frequency Allocation to WiMax and Broadband Wireless Access Service Provider;

We acknowledge receipt of your letter dated 30 October 2006 regarding the above subject matter.

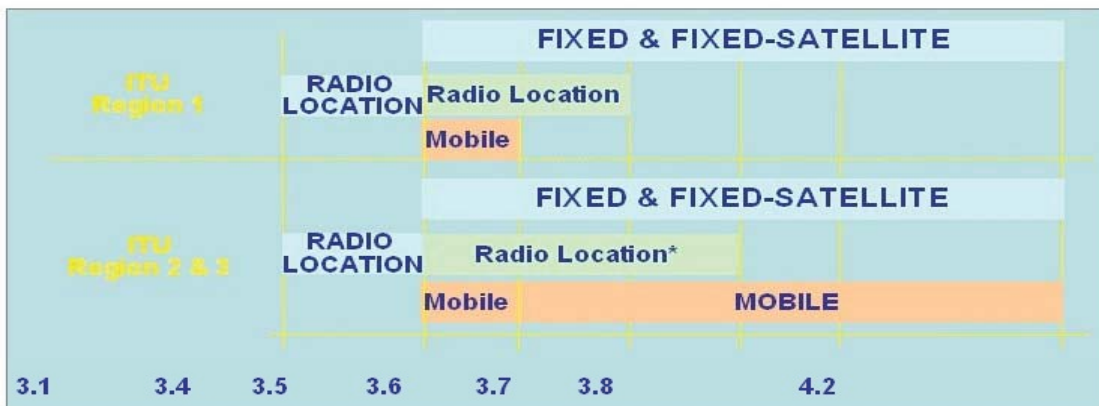
We regret to learn that your client [REDACTED] has been experiencing interference on their VSAT services.



ITU WRC-07 C-Band Spectrum



ELECTROMAGNETIC & SENSOR SYSTEMS DEPARTMENT



**No Change in ITU
Radio Regulations
Table on 3400-4200
(victory?)**

* Primary U.S. by Footnote 5.433

**Post WRC-07 'Opt-In'
Foot Noted Countries
(Mobile 3.4-3.6 GHz)**

- 3400-3500 Mobile
- 3400-3600 Mobile
- 3400-3600 Mobile
- 3400-3500 Mobile

**PFD
Limits**



Addressing Spectrum Proceedings

- WBU-ISOG Endorsed GVF C-band Paper
- Submission to National Spectrum Proceedings Has Begun in Multiple World Regions, Including...
 - United Arab Emirates
 - Iraq
 - FCC
 - Angola
- And in Inter-Governmental Proceedings...

The ITU

- Pursuing Enforcement of WRC-07 C-band Decision
- Preparing for WRC 2012...
 - Agd Item 1.13 - Protect 21.4-22 GHz for HD/BSS
 - Agd Item 1.19 - Protect All Satellite Bands from SDR/CR
 - Agd Item 1.20 - Protect 5850-7075 from HAPS
 - Agd Item 1.22 - Protect All Satellite Bands from UWB
 - Agd Item 1.25 - New Satellite Spectrum at 4-16 GHz ++?
- Next Step: Defend Ku- and Ka-bands!

Addressing Sub-Optimal Networks

- **New: GVF Piloting Network Validation Service**
- Team Evaluating VSAT Network in 27 Countries
- Initial Findings: Most/All Facets of Interference-Mitigation Initiative Would Help Network Performance
- Report to be Submitted to Owner on How to Optimise Network and Prevent Interference
- GVF Board to Consider Network Validation as Latest Feature of Interference-Prevention Initiative

Thank You!

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