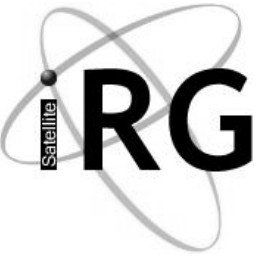


Satellite Interference! & Carrier ID

STOP Interference Now! (it's a SIN!)





Concentrating on Carrier ID...

Our Goal: ALL Video Transmissions for the 2012 Olympics to have Carrier ID!

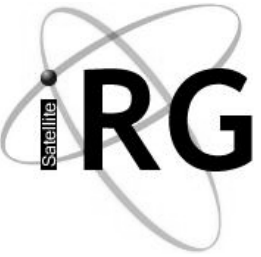
Since the Carrier ID Forum, Intelsat HQ – Washington DC

18th November 2009...

- Three Working Groups – Video & Data (by sIRG) + VSAT (by GVF)
- Enhanced Specification for Video Encoders generated and ratified by WBU-ISOG (original developed in 2006)
- New Technology for developed by Comtech for both Video & Data released at the 2011 Washington Satellite Show
- RFI End User Initiative started Feb 2011 headed up by CNN & ABC
- sIRG, GVF, WBU-ISOG & RFI EUI working together to make this happen! We have a **Charter!**

STOP Interference Now! (it's a SIN!)





...what are we trying to achieve for ID?

- Ensure we have a **Resilient, Global**, ID method & specification
- ID technology should be “Shareware”
- Get Industry to make it a DVB/SMPTE Standard!
- Coordinate with other industry organizations to address regulatory issues, & ensure adoption of Carrier ID.

...how

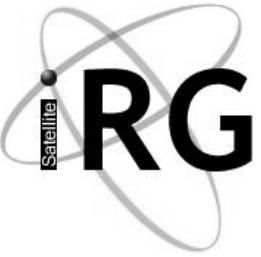
- Bring the right players to the table & sponsor ID to the DVB committee: We need x2 Satellite Operators, x2 Manufacturers x1 Broadcaster!
- **Use & Test** the solutions we have.

...sIRG Plan

- Bring together Industry. We have started at this year’s NAB with Comtech, Ericsson, Newtec & Vislink.
- Get Broadcasters, worldwide, on board – the RFI EUI is a great start

STOP Interference Now! (it’s a SIN!)





MetaCarrier™ Introduction

Comtech's approach to a more resilient Carrier ID technology...

Use of the Meta prefix in it's meaning of being a description of something else

In this case, MetaCarrier™ means that we have a separate carrier that contains information, that is used to describe either;

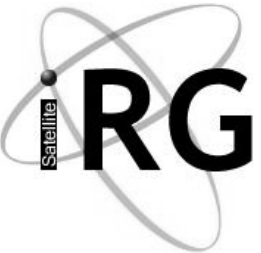
- Another single carrier
- A group of carriers
- A relay, such as a satellite transponder, or terrestrial wireless relay

What is unique is that the MetaCarrier™ is embedded using spread spectrum techniques within the carrier(s) or relay, without adding appreciable noise to the carrier(s) or relay

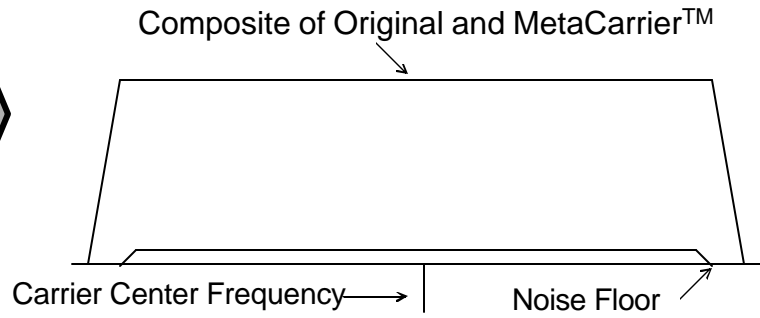
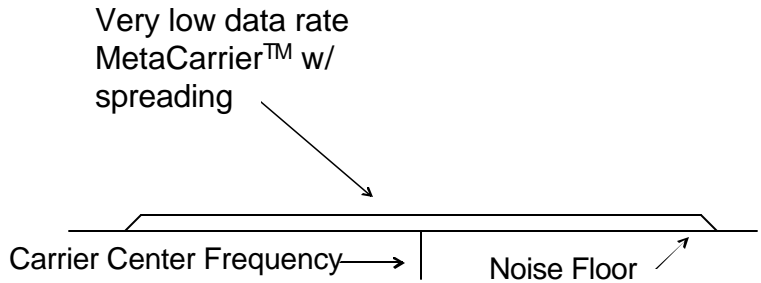
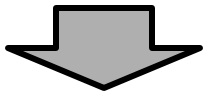
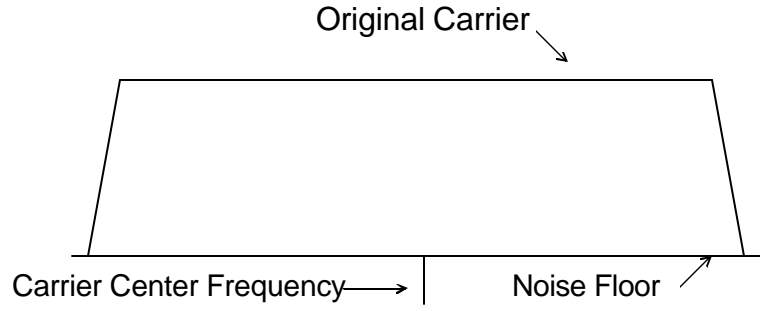
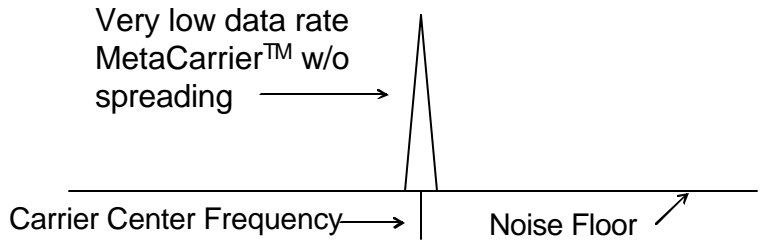


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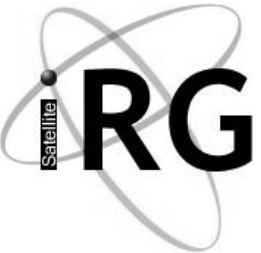
MetaCarrier™ Overlay



...courtesy of 

STOP Interference Now! (it's a SIN!)





MetaCarrier™ Carrier ID Format

```
Control Term #2
*****
* ----- Incoming Message ----- *
* - MAC: 00:06:B0:01:AB:FD Receiving Msg - *
* - Latitude: - *
* - Longitude: - *
* - Operator: Germantown - *
* - Manufacturer: CEFD - *
* - Telephone Number: 800-555-1212 - *
* - Center Frequency: 1077.00MHz - *
* - Symbol Rate: 1.575300MHz - *
* - Custom Msg: Germantown Test - *
* ----- *
* *
* Carrier Detected: Detected *
* Message Locked: Locked *
* *
* Estimated Symbol Rate: 1.333248 Msps *
* Estimated Center Freq: 1076.999349 MHz *
* *
* Press 'c' to enter command mode *
* Press 'u' to re-enter user mode *
*****
```

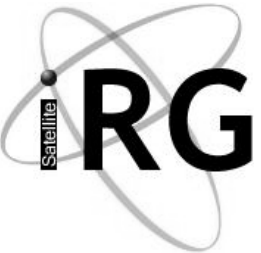


All of the fields for Carrier ID are optional and need not be transmitted



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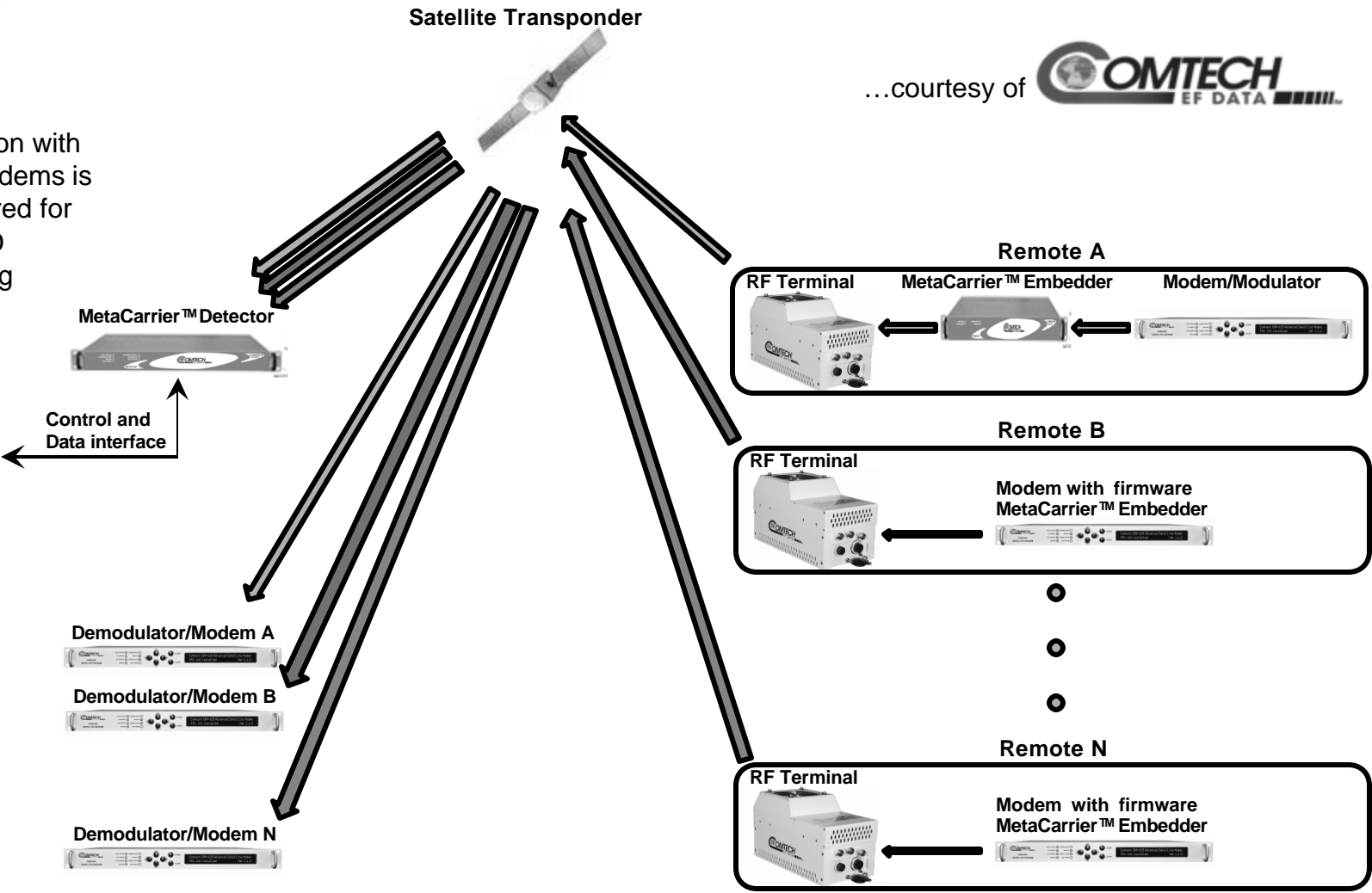


MetaCarrier™ Carrier ID Topology - SCPC

...courtesy of COMTECH EF DATA

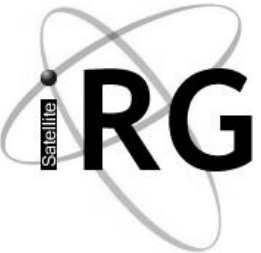
Co-location with traffic modems is not required for Carrier ID Monitoring

Transponder Spectrum Monitoring System



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Minimal Impact of MetaCarrier™ ...

Carrier ID Power Spectral Density Reduction Calculator

User Input

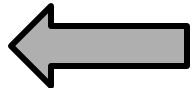
User Data Carrier Symbol Rate (9.6 Ksps to 63,000.0)	32.000	Ksps
User Data Carrier C/N Max (0.2 to 40.0)	20.0	dB
Noise Floor of System (-100.0 to 0.0)	-80.0	dB
Is Eb/No Information Known (Modulation and FEC Coding)?	Yes	
Modulation Index (1/2/3/4/5)	1	
FEC Code Rate	1.0	
User Input Required		

Carrier ID Configuration

Carrier ID Chip Rate	4,096	
CID Carrier Chip Rate	28.000	Kcps
CID C/N	0.1	dB
Scaling Ratio	87.50%	
Difference between Original Data Carrier and CID Carrier	19.9	dB
Spread Attenuation	-36.123599	dB
Spread Ratio	-0.579919	dB
Spread Correction	-36.703519	dB
Degraded C/N	19.90820175	dB

Degradation Output

Input C/N	20.0000	dB
Degradation due to CID	0.0918	dB
Output C/N	19.9082	dB
Output Eb/No	19.9082	dB

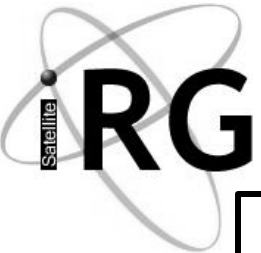


...courtesy of

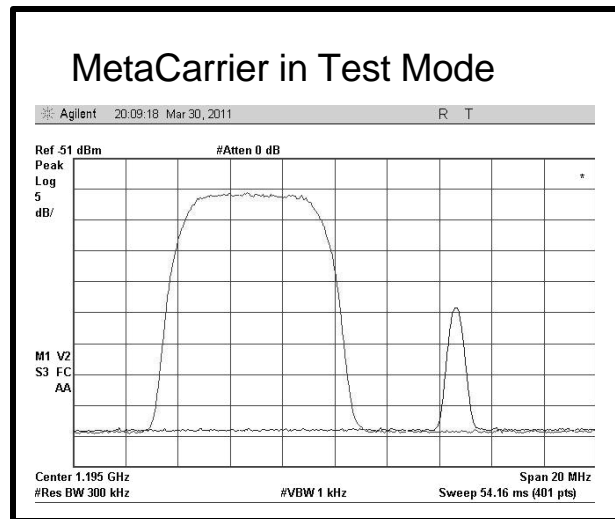
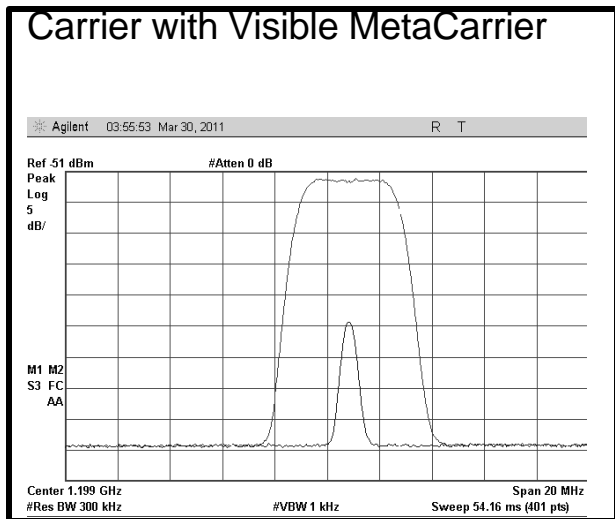
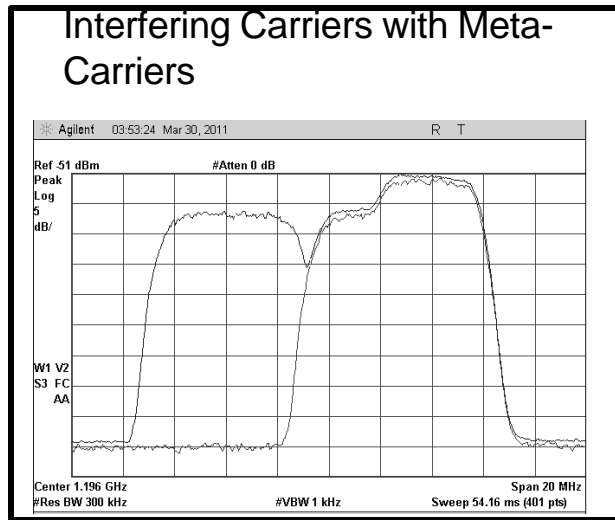
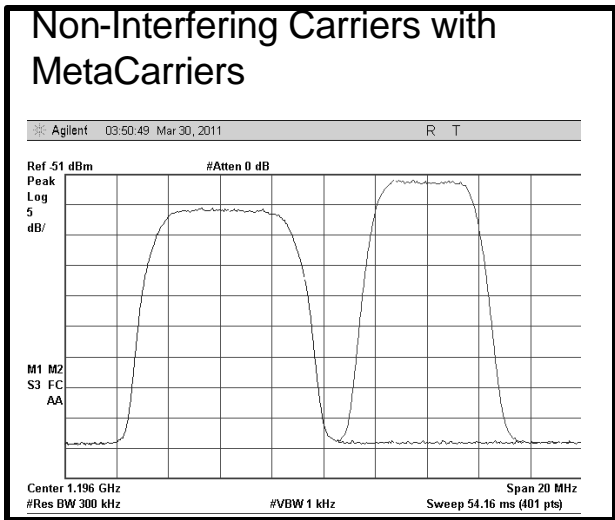


STOP Interference Now! (it's a SIN!)





MetaCarrier™ Spectrum Plots...

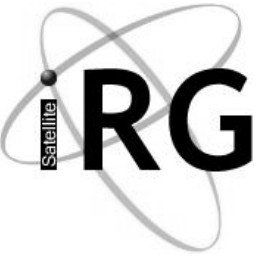


Note: MetaCarrier can only be seen when in test mode



STOP Interference Now! (it's a SIN!)





MetaCarrier™ other Applications...

Smart Beacon™ approach... A long needed step to simplify earth station installation procedures. Potential to automate the process

Enhanced Station Pointing

- Maximizes cross-polarization operation; the installer can have auto-feedback that they are on the correct polarization

Transponder ID™

- Provides a beacon with the transponder and satellite name, orbital location, operator, ephemeris, etc.

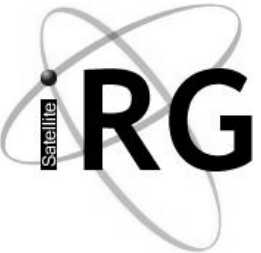
Used Together

- Can significantly reduce the probability of improper station setup / configuration
- Increase the probability of accurate pointing COTM/SNG Auto Deploy
- Can be used to automate earth station install and lineup



STOP Interference Now! (it's a SIN!)

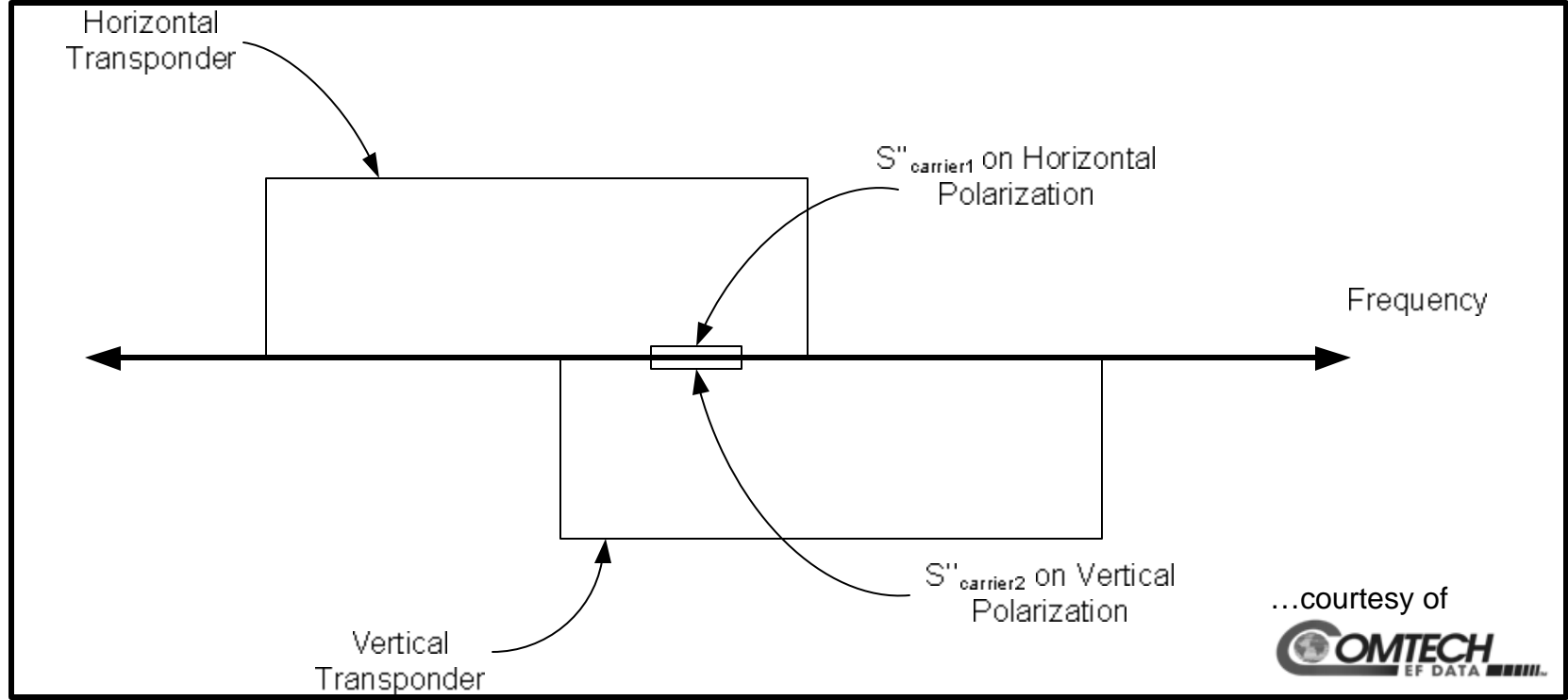




MetaCarrier™ Enhanced Station Pointing...

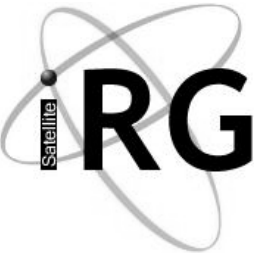
Spread spectrum carriers are overlaid in frequency with one polarization on top of the other each have the same bit string.

When the installer has lined up on the correct polarization the output of a spread spectrum correlation provides a positive indicator.

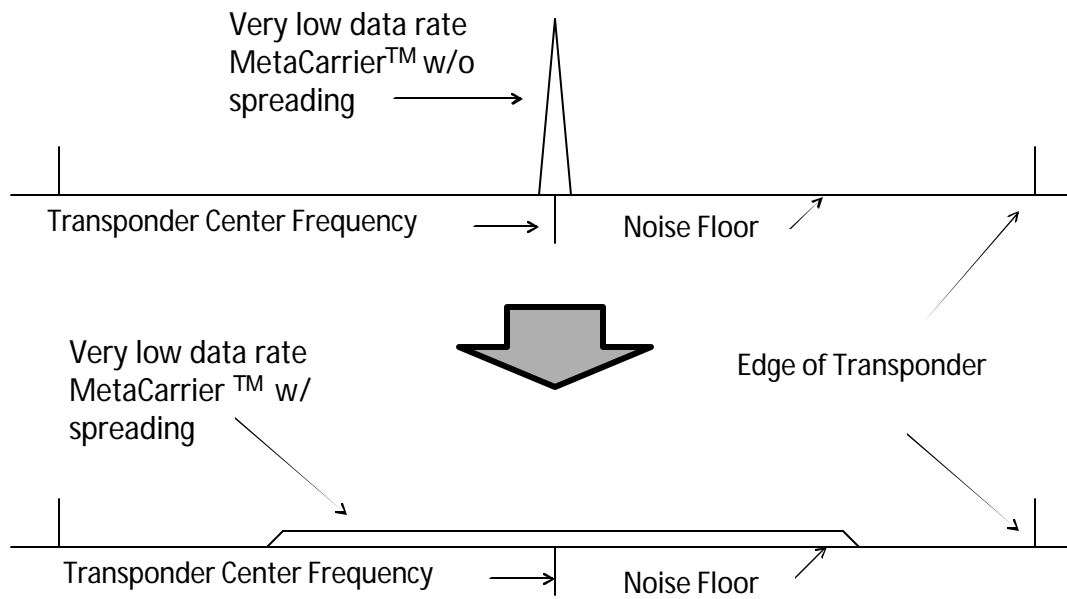


STOP Interference Now! (it's a SIN!)





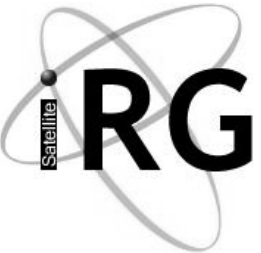
MetaCarrier™ for Transponder ID™...



- Transponder ID™ MetaCarrier™ Contains...
- Transponder number
 - Polarization
 - Satellite name
 - Ephemeris
 - Orbital location
 - ...more?
- ...courtesy of
-

STOP Interference Now! (it's a SIN!)



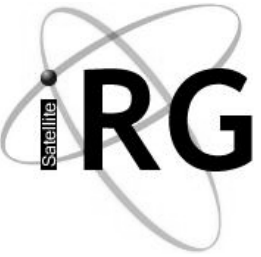


In Conclusion...

- **“Carrier ID” is not going away!**
- It will help Operations Personnel sleep better at night !!
- Promote it !!!
- **MAKE IT HAPPEN for 2012!!!!**

STOP Interference Now! (it's a SIN!)





For More Information - Contact...

- sIRG: Exec Director, Martin Coleman

Email: martin.coleman@satirg.org

- GVF: Secretary General, David Hartshorn

Email: david.hartshorn@gvf.org

- WBU-ISOG: Chairman, Dick Tauber

Email: dick.tauber@turner.com

- RFI EUI: Co-Chairs, Dick Tauber (CNN)

Email: dick.tauber@turner.com

Rich Wolf (ABC)

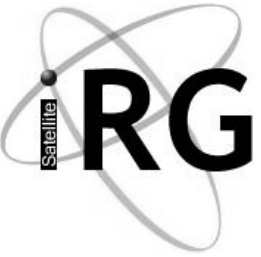
Email: richard.p.wolf@abc.com

- COMTECH: Fred Morris (VP Global Sales Engineering)...

Email: fmorris@comtechefdata.com

STOP Interference Now! (it's a SIN!)





Background on sIRG

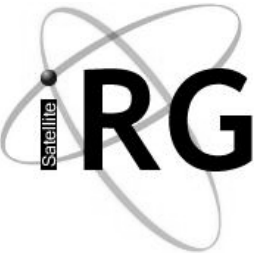
- The former Satellite Users Interference Reduction Group (SUIRG) was restructured in February 2011 and rebranded:

satellite Interference Reduction Group (sIRG)

- It will actively pursue interference reduction by promoting:
 - Use of best operations practices
 - Investigation of new technologies and techniques
 - Development of training and certification programs for installers and users
 - Coordination with other industry organizations to address regulatory issues, and ensure adoption of Carrier ID
- Members total 34, including satellite operators and other organizations
 - New Members are wanted, to get new ideas, grow participation, expand industry-wide implementation of interference mitigation initiatives

STOP Interference Now! (it's a SIN!)



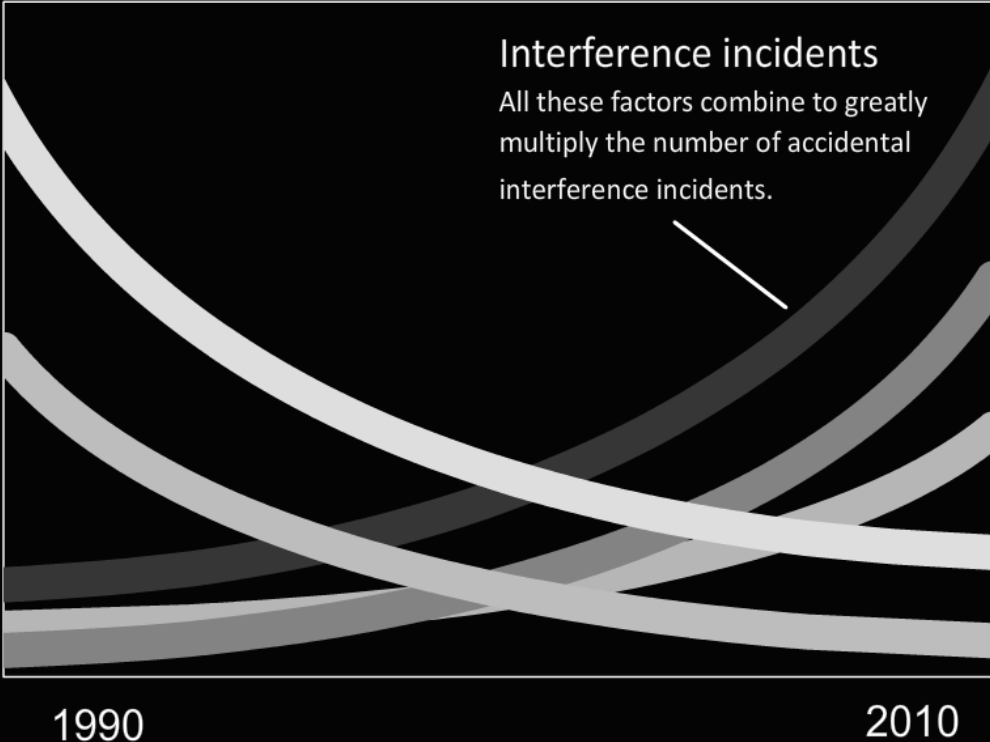


Why is Interference Increasing?

Analysis supplied by GVF...

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.

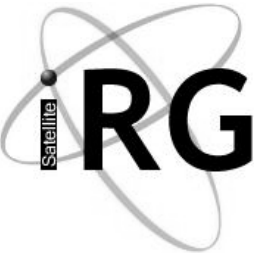


Deployments
 Over 100,000 VSAT terminals installed per year. Any one can cause serious interference.

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.

STOP Interference Now! (it's a SIN!)





Satellite RFI: Breaking It Down

Problems:

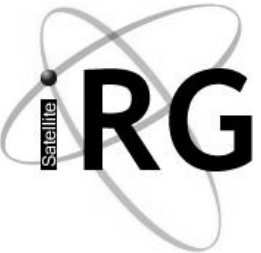
1. Unidentified Carriers
2. Improper Installations
3. Sub-Standard Equipment
4. Wireless Interference
5. Insufficient Incident Coordination

Solutions:

- ✓ Carrier ID
- ✓ Training & Certification
- ✓ Type Approvals
- ✓ Spectrum Initiative
- ✓ Data Sharing Centre

STOP Interference Now! (it's a SIN!)

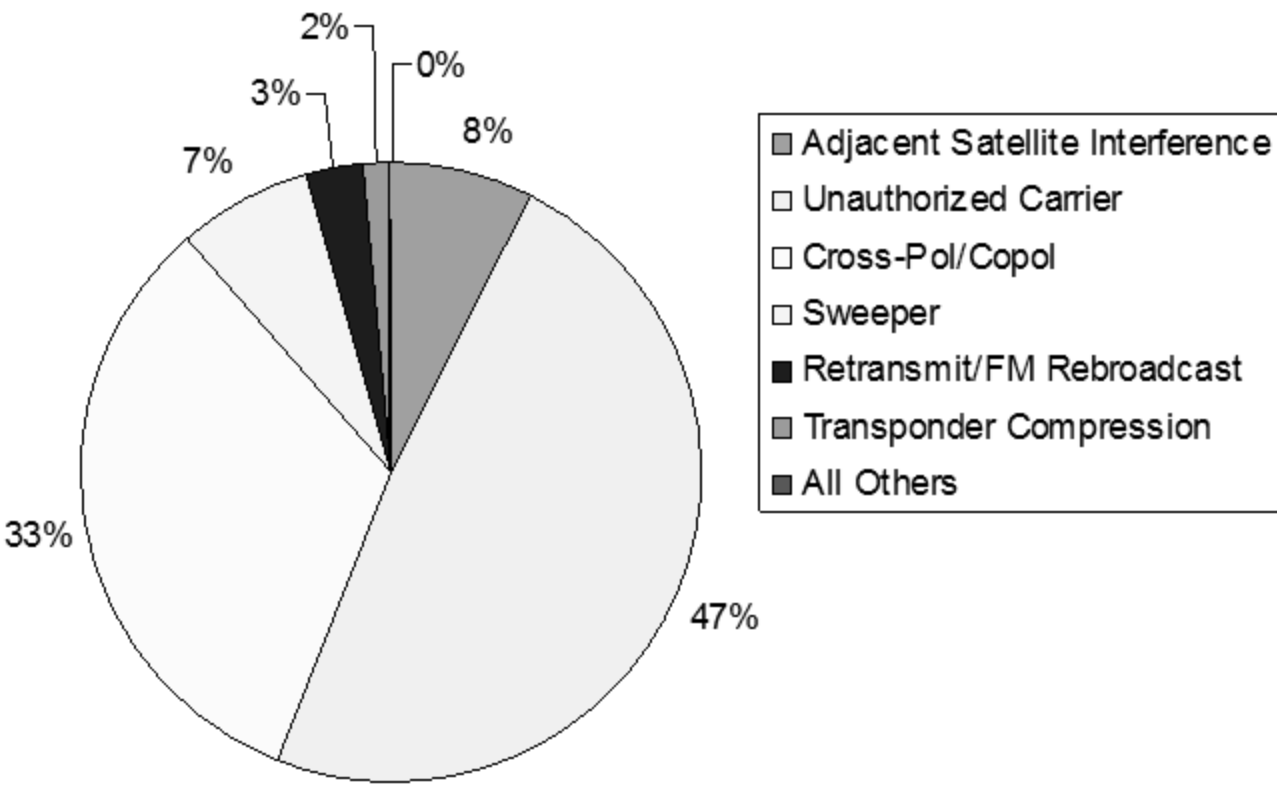




The Stats!

Data supplied by Intelsat...

Interference Types 6 Month Average



STOP Interference Now! (it's a SIN!)

