Spectrum Changes Impacting Electronic News Gathering Operations in The United States

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Presentation to:

ITU, SG6

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Introduction:

Spectrum Overcrowding in the United States:

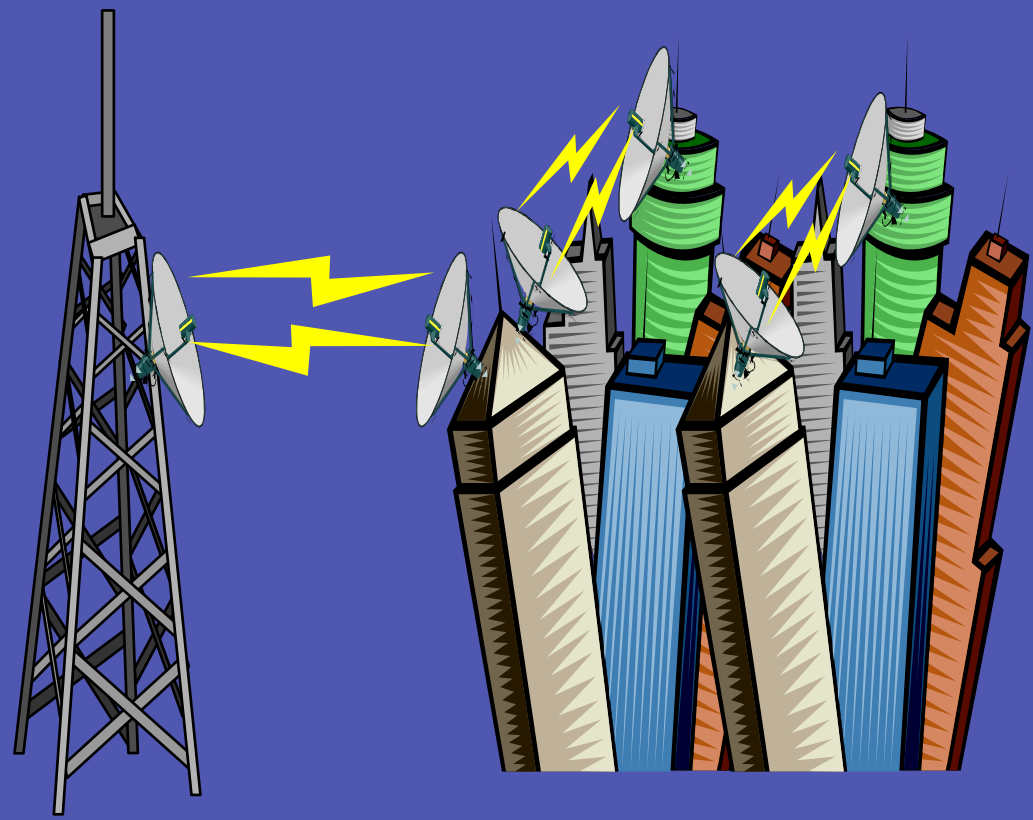
It is Exponentially More Difficult for News Events:

- Location (unmovable!)
- Great Public and Therefore Media Interest
- Lack of Options
- New Unlicensed Users and Uses

Spectrum Congestion Analysis

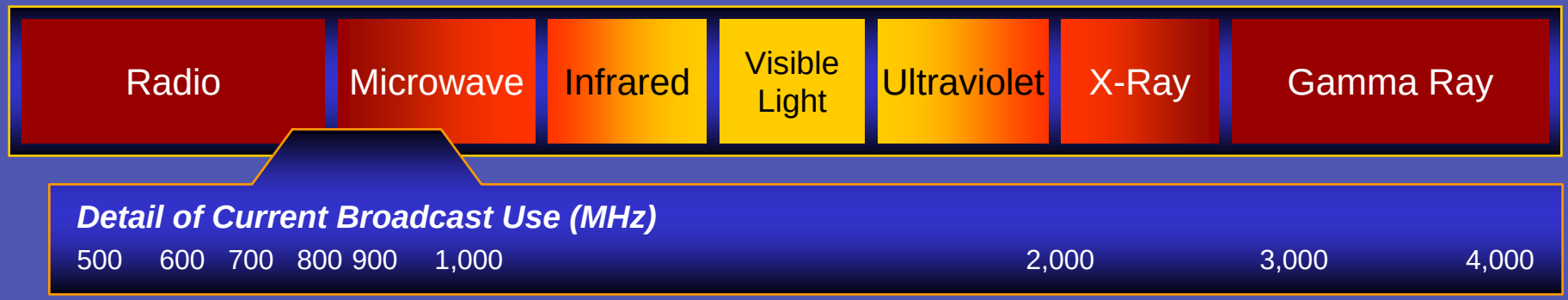
- There is huge congestion in the BAS.

- More requests in existing bands.
- Some bands have huge coordination problems.
- Problems are compounded by sharing within same bands.
- Problems used to be managed by cooperation, now challenges are too large

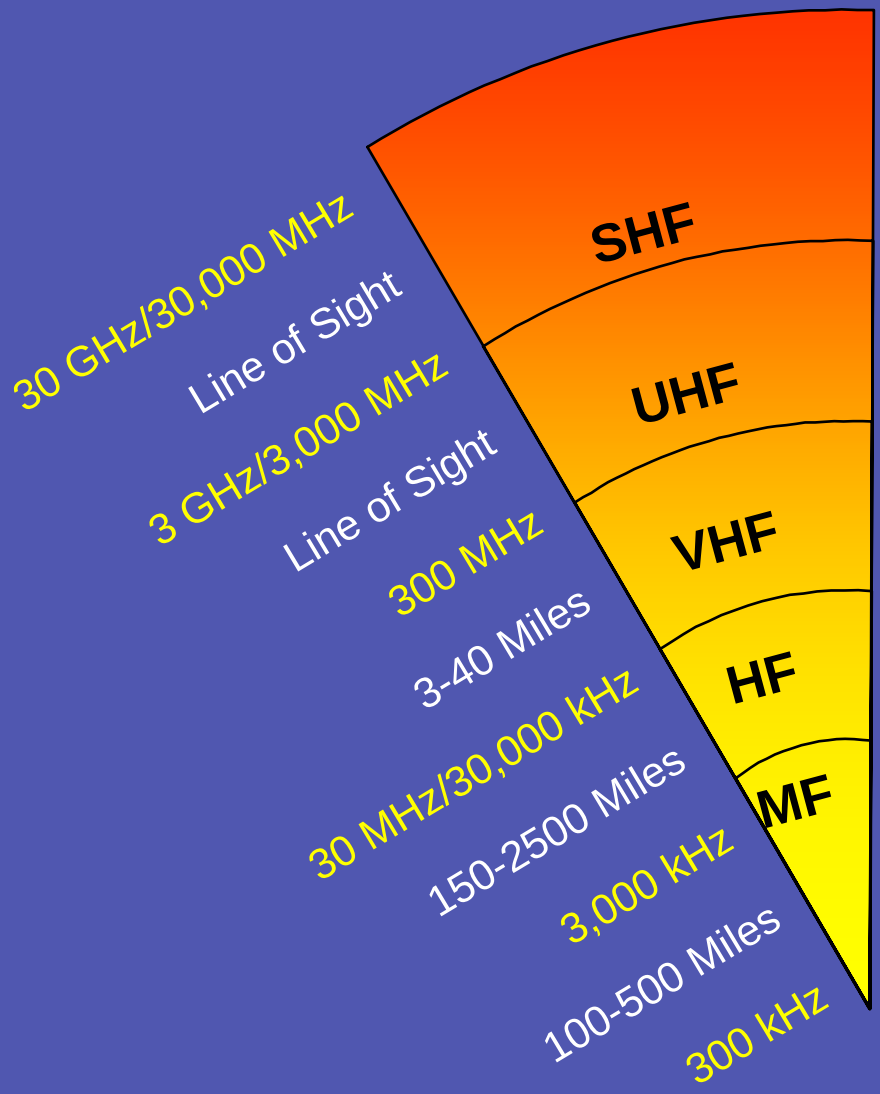



RF Congestion

New Spectrum Uses



Typical Users of the Spectrum



Satellite Systems (500 MHz)
Radars (10- 30 MHz)

Channel 20 506-512 (6 MHz; 6000 kHz)
Taxi (25 kHz)

Channel 5 72-86 (6MHz;6000 kHz)
Police, Fire, Ambulance Radio (20 kHz)

Citizens Band Radio (10 kHz)

Voice Radio (3kHz)

Commercial Broadcast Band (540 - 1600 kHz)

Wireless Applications –growing daily

- Businesses
- Cable Operations
- Personal Communications
- Return Video for Live Programming
- Data Systems
- Electronic News Gathering
- DBS Type Systems

ENG (Occasional Broadcast use) is up against growing wireless applications

- Wi-Fi Family
- Businesses
- Cable Operations
- Personal Communications
- Return Video for Live Programming
- Data systems
- Electronic News Gathering
- DBS systems

Impact on Broadcaster?

“ Radio Frequency Interference”

- *Static, noise, or voice carryover on discrete communications channels*
- *Poor video quality*
- *Inaccurate data link transmissions*
- *Mis-cues*
- *Potential to disrupt or prevent reception of any RF transmission*

Broadcasters Do Use High Technology!

- In some cases, Procedures For Licensing Are Not Yet Available!

- Goal is More Efficiency.

- Co-Channel Use Cannot Be Mitigated, technology Cannot Solve

Other Mitigation Potentials

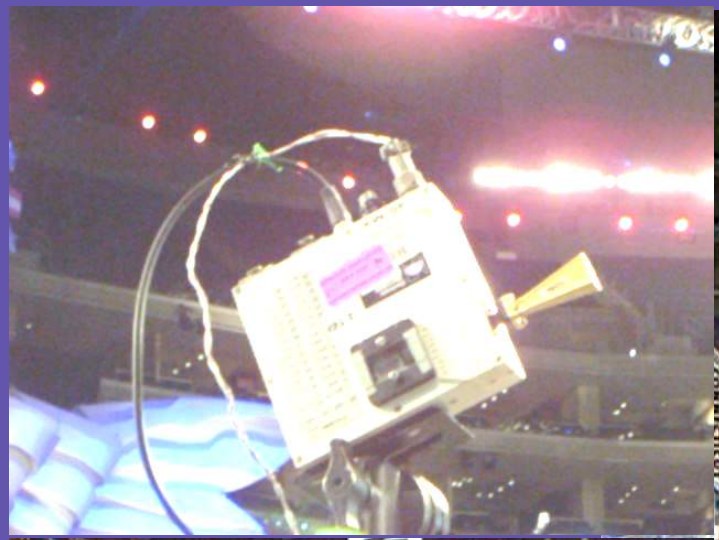
- Bandplan Managers

- Temporary Coordinations

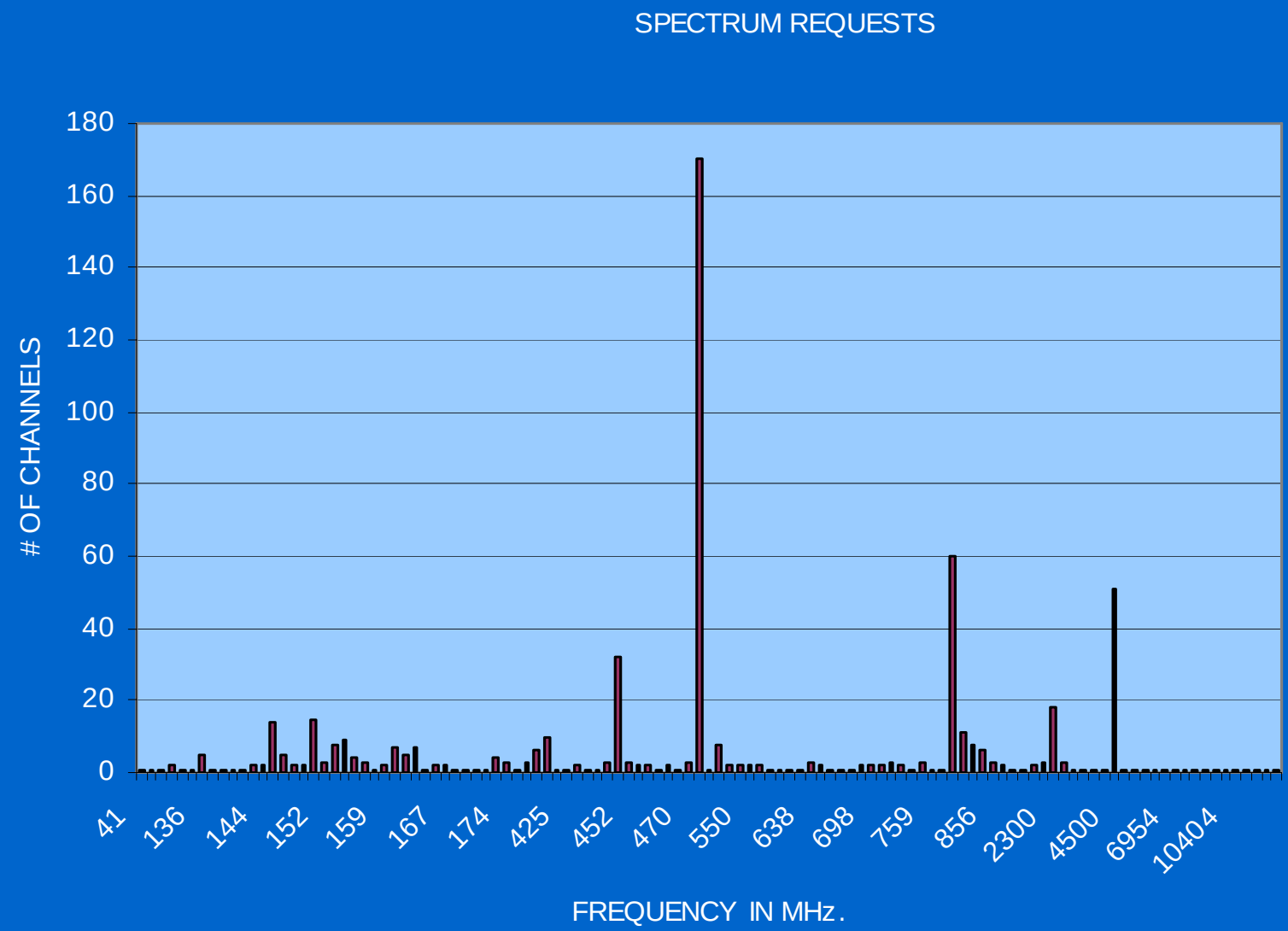
A Major News Event Broadcast Compound

Network RF Compound

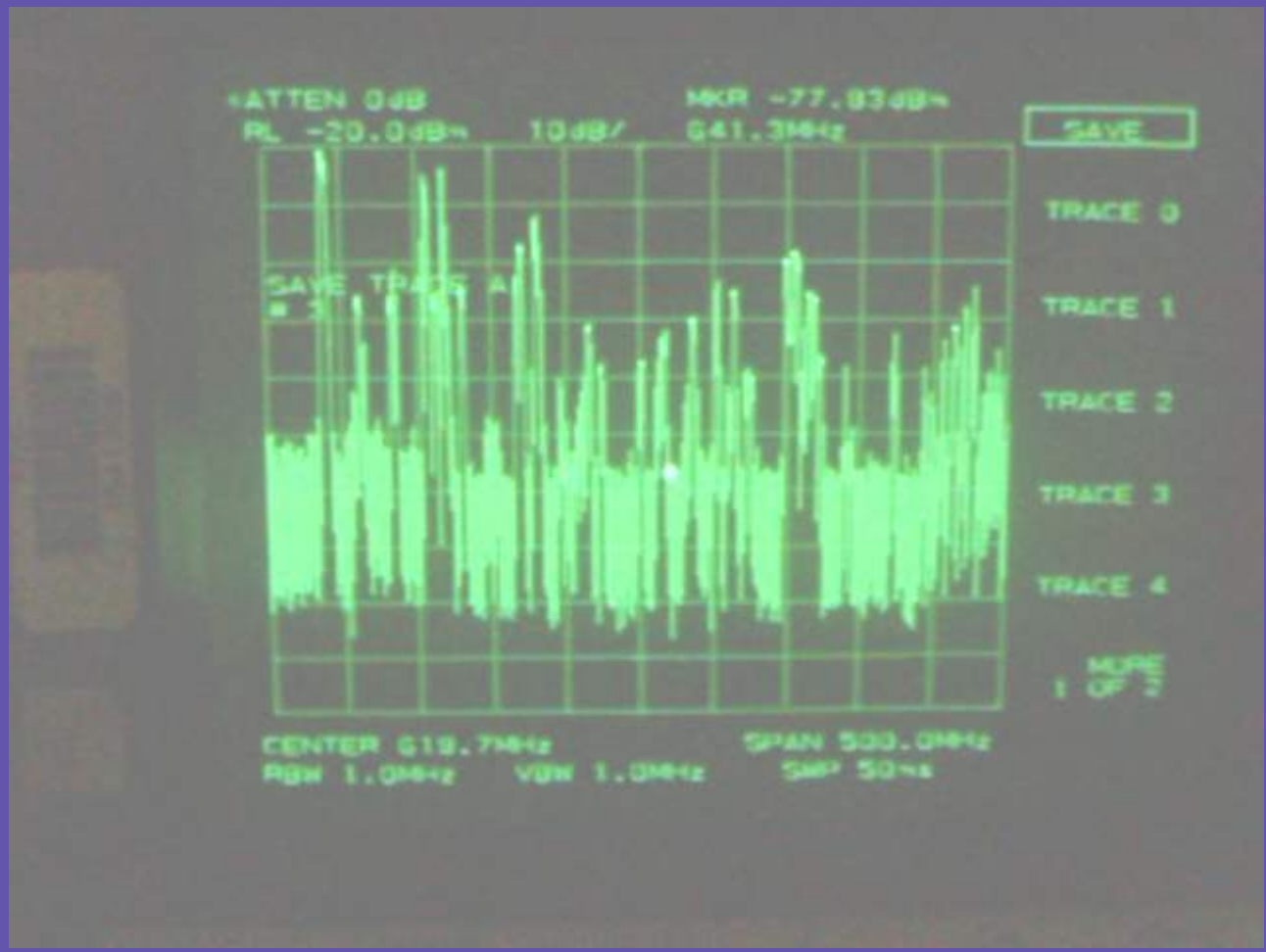
Rehearsals For Covering News Events



Temporary Channel Use



Example of Temporary Congestion



RESTRICTED RADIO DEVICES

COMMERCIAL

2-WAY

TRANSCEIVERS

WIRELESS MICROPHONES

WIRELESS LAN

- USUALLY HAS ONLY ONE ANTENNA.
- IF USED IN VENUE, MUST BE STICKERED.
- STICKER INDICATES IF RADIO IS TO BE USED INSIDE OR OUT.
- CANNOT BE OPERATED IN STADIUM IF NOT STICKERED. NO EXCEPTIONS.
- NON-STICKERED RADIOS MUST BE BAGGED AND TAPED.
- LAPTOPS MUST BE CHECKED FOR WIRELESS LAN CARDS.

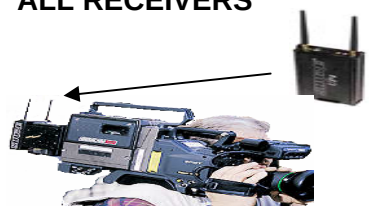
NON-RESTRICTED RADIO DEVICES

FRS RADIOS

CELL PHONES

SCANNERS

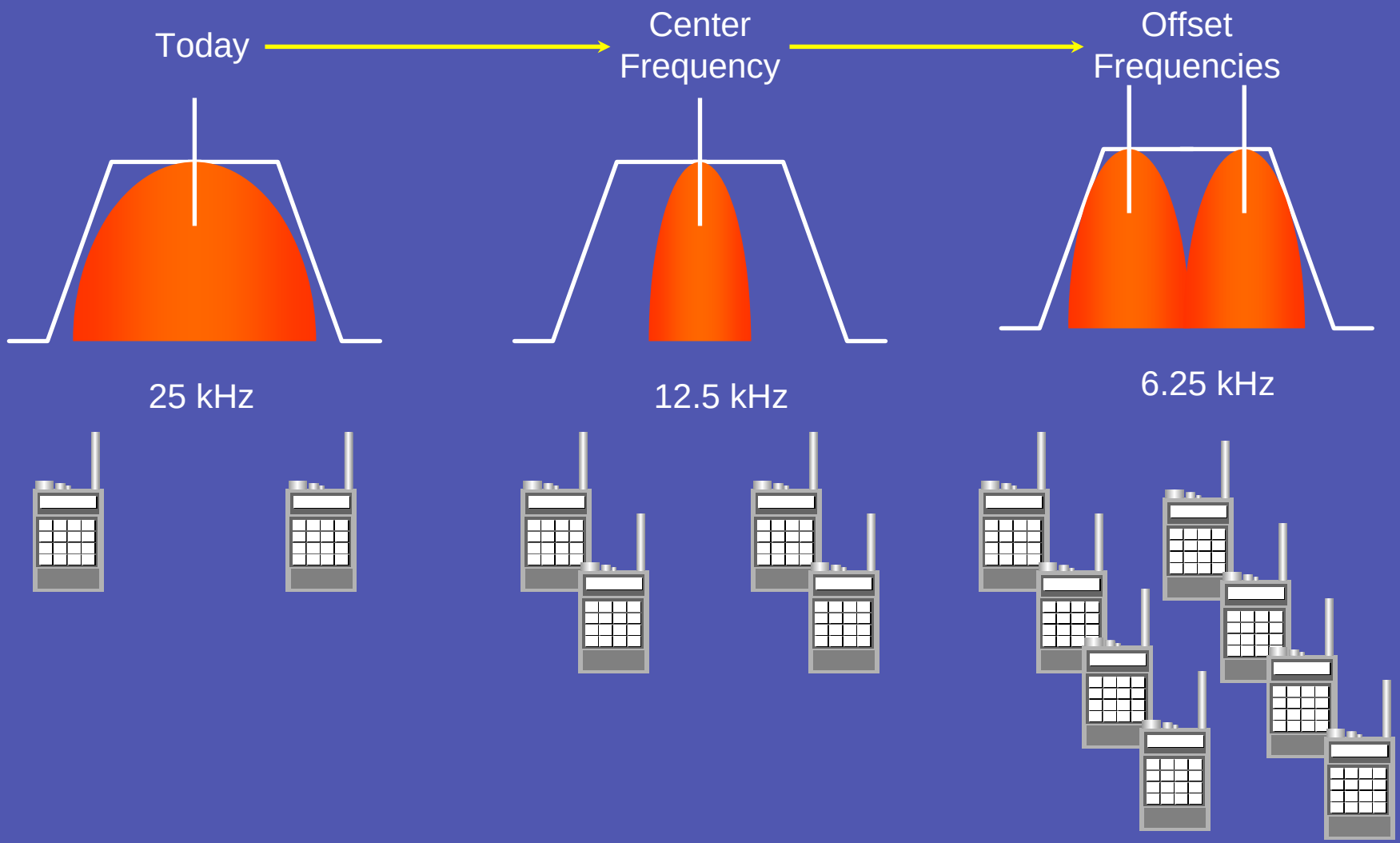
ALL RECEIVERS



Self Enforcement In Action

What Is The Impact of Introducing 10 New Wireless Microphones?

Increase in Capacity –going that way!



Broadcaster Auxiliary in the US:

25.8 -26.5 MHz RPU stations

152-162 MHz RPU stations

174-216 MHz Wireless microphones

450-451; 455-456 MHz RPU stations

470-806 MHz Wireless microphones

944-952 MHz Aural BAS, STL, ICR

Broadcaster Auxiliary in the US:

2025-2110 MHz	12 MHz wide for ENG
2450-2483.5 MHz	16.5 and 17 MHz wide for ENG
2483.5-2500 MHz	One 16.5 MHz wide channel for ENG,(GFed)
6425-6525 MHz	1, 8 and 25 MHz wide channels-mobile
6875-7125 MHz	25 MHz wide channels, p-to-p fixed links

Broadcaster Auxiliary in the US:

12700-13250 MHz 25 MHz wide channels, p-to-p links shared with CARS (6, 12.5 MHz)

17700-19700 MHz p-to-p links; Aural and TV STLs and ICRs; temporarily co-primary with fixed satellite until 2010

19300-19700 MHz p-to-p links; Aural,TV STLs and ICRs

Wireless Microphones

Have no permanent home!

More new users are coming!

The most sensitive devices

FREQUENCIES

How are they used?

- Video: ENG, microwave links...
- Audio: wireless microphones, IFB, PL...
- 2-way: communications...
- Data: telemetry, control...

Special Temporary Authorization's

- VHF: 150-170 MHz.
- UHF: 450, 470-800 MHz.
- Microwave: 1.4 to 42 GHz.
- Process With Better Feedback Needed!

Wireless Requirements for Large News Event

MICROWAVE FOR CAMERAS

# Channels	Frequency	Usage	Origin
5	1.435-1.52GHZ	RF camera	1.4GHz AFTRAC band, approved by AFTRAC and STA from the FCC
2	2.36-2.39GHz	RF cameras	2.3.4GHz AFTRAC band, approved by AFTRAC and STA from the FCC
1	2496GHz	RF camera	2.5GHz channel 10 from television band
5	2.5-2.6GHz	RF camera	STA from FCC for the week
1	2016.5GHz	Blimp camera	2GHz Broadcast band channel 2
1	2050GHz	Return video	2GHz Broadcast band channel 4

"What can we expect to see?

- 2-Way Radios, Repeaters, Trunking Units .
- Personal Communicators (FRS Radios)
- Broadcast Video Cameras
- Electronic News Gathering (ENG)
- Satellite System Transmitters/Receivers
- Wireless Mics
- Wireless LAN
- Remote Controlled Devices (Cameras)

At Large Events Spectrum Management

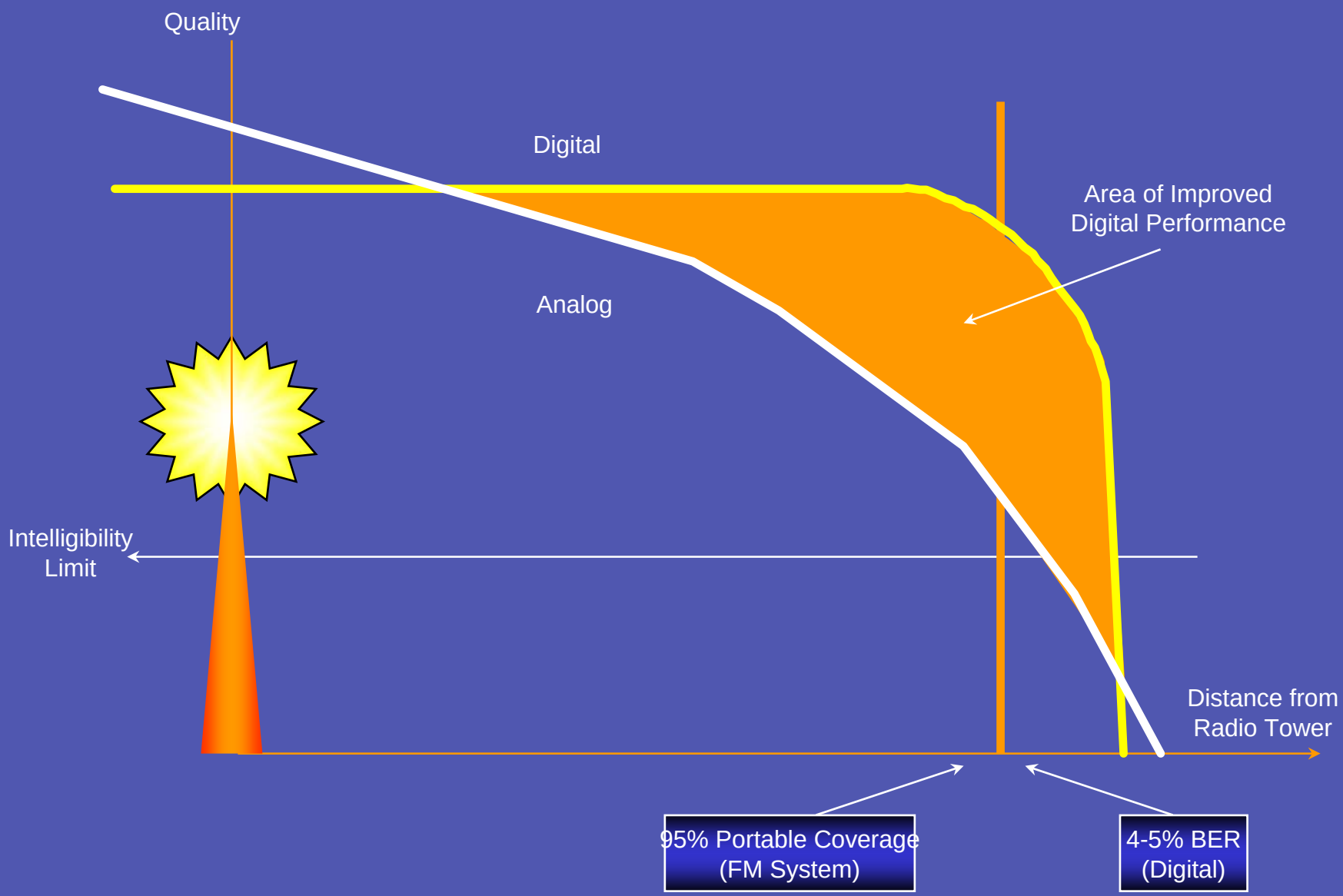
- Assign Frequencies to visiting Press and Broadcasters.
- Certify RF Equipment for in-venue and outside the fence operation.
- Receive Part 74 Authority from the FCC
- Participate in Event RF interference identification and mitigation.
- Assist Operations in preventing operation of un-authorized RF devices

HD Video Spectrum Needs

Need (x times) the bandwidth (uncompressed)

- Need new frequencies
- Tests are indicating that 40 Ghz or 90 Ghz may work
  - These are problematic for rain, fog, and foliage

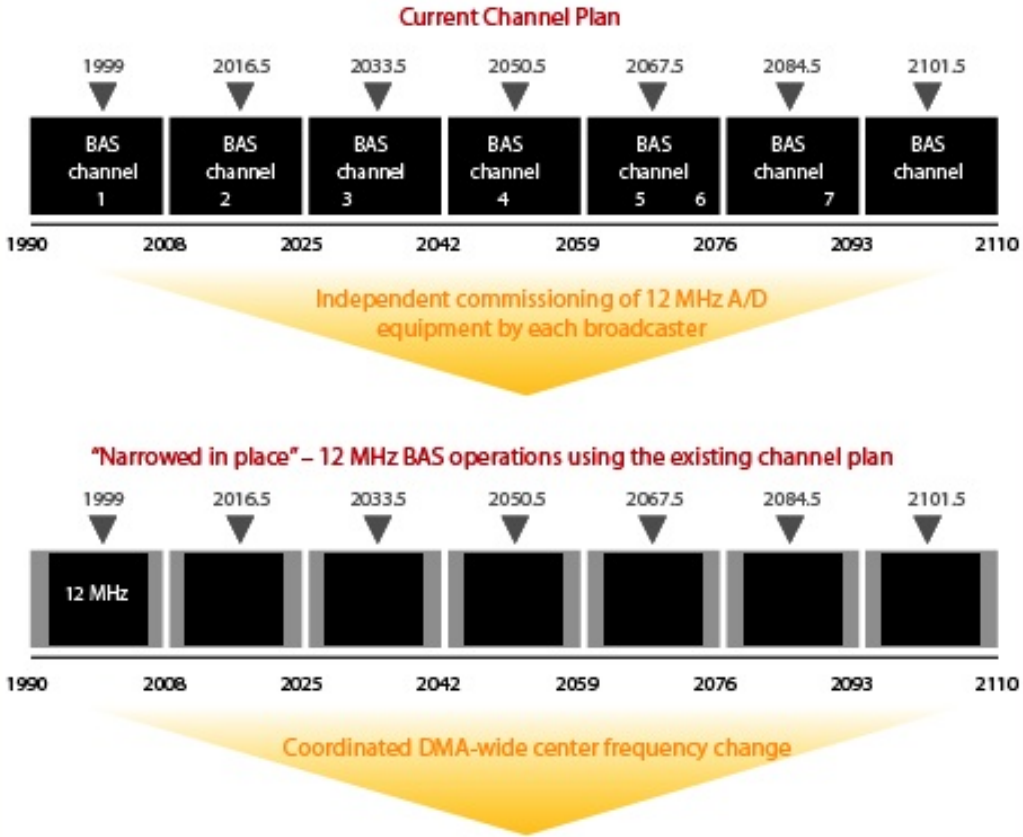
Digital Performance



2 GHz Relocation Overview

- FCC Fifth Report and Order,FCC 04-168
- Adopted by Commission – July 2004 July 2004
- Nextel-BAS Relocation Plan
- Clears BAS licensees from 1990 Clears BAS licensees from 1990-2025 MHz

Broadcast Relocation to the New Channel Plan



FCC Filing Procedures

File to simultaneously authorize all technical operating parameters during transition

Specify channels and emissions before/after transition

Modify existing channels to add emissions for digital operation in the old channel plan

Simply add frequencies as a separate path with digital emissions for new channel plan

Exhibit to indicate that plan is to convert to new channels

2 GHz Digital Return Link (DRL)

Two 500 kHz bands = 20- 25 kHz wide channels

“Handshake” signal between receive/transmit site

DRL channels are on same path as the frequencies of the new channel plan

EIRP: 65dBm (TV Pickup max) EIRP: 65dBm (TV Pickup max)

Frequency Tolerance: +/ Frequency Tolerance: +/- 100Hz 100Hz

2 GHz Spectrum Relocation Project Schedule

Example: Hartford - New Haven

1. Inventory Verification August 1, 2005

2. Broadcaster Inventory June 15, 2005: Stations began to complete their inventory and submit.

3. Market Kickoff Meeting June, 2005

4. No Transition Date set

COFDM: Moving ENG Transmission

2 GHz Relocation Status Summary

	Number	Percentage
• Markets Initiated	117	57%
• Stations Engaged	640	60%
• Inventories Submitted	581	31%
• Inventories Completed	323	3%
• Agreements Completed	15	1%

2 GHz Relocation Status Summary

- 117 Markets have begun the relocation process as of Feb 20th
- 270 Stations are now gathering quotes
- 17 Licensees now have agreements in-hand for signature
- Equipment selection is taking longer than expected.
- Ultimate Sept 2007 Deadline?

2 GHz Project Interoperability Status

- No “standards” committee
- Two Manufacturers are working together
- They have 90+% of market
- Tested several encoders with positive results
- They have not tested other RF vendors’ products
- A change in a chip set can make a product “non-compliant”
- Today “standards” implementations vary
- Interoperability without an industry standards committee?

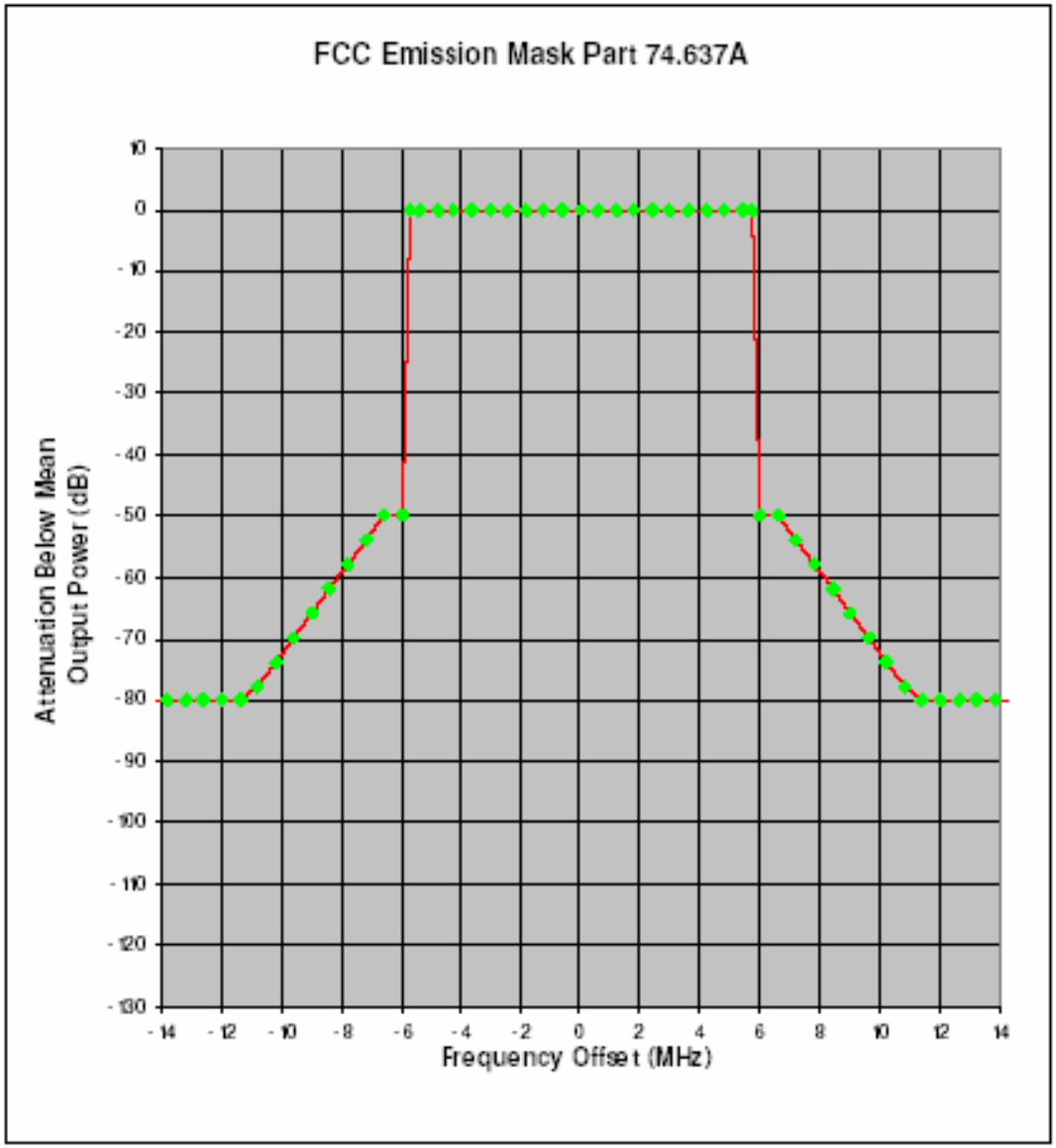
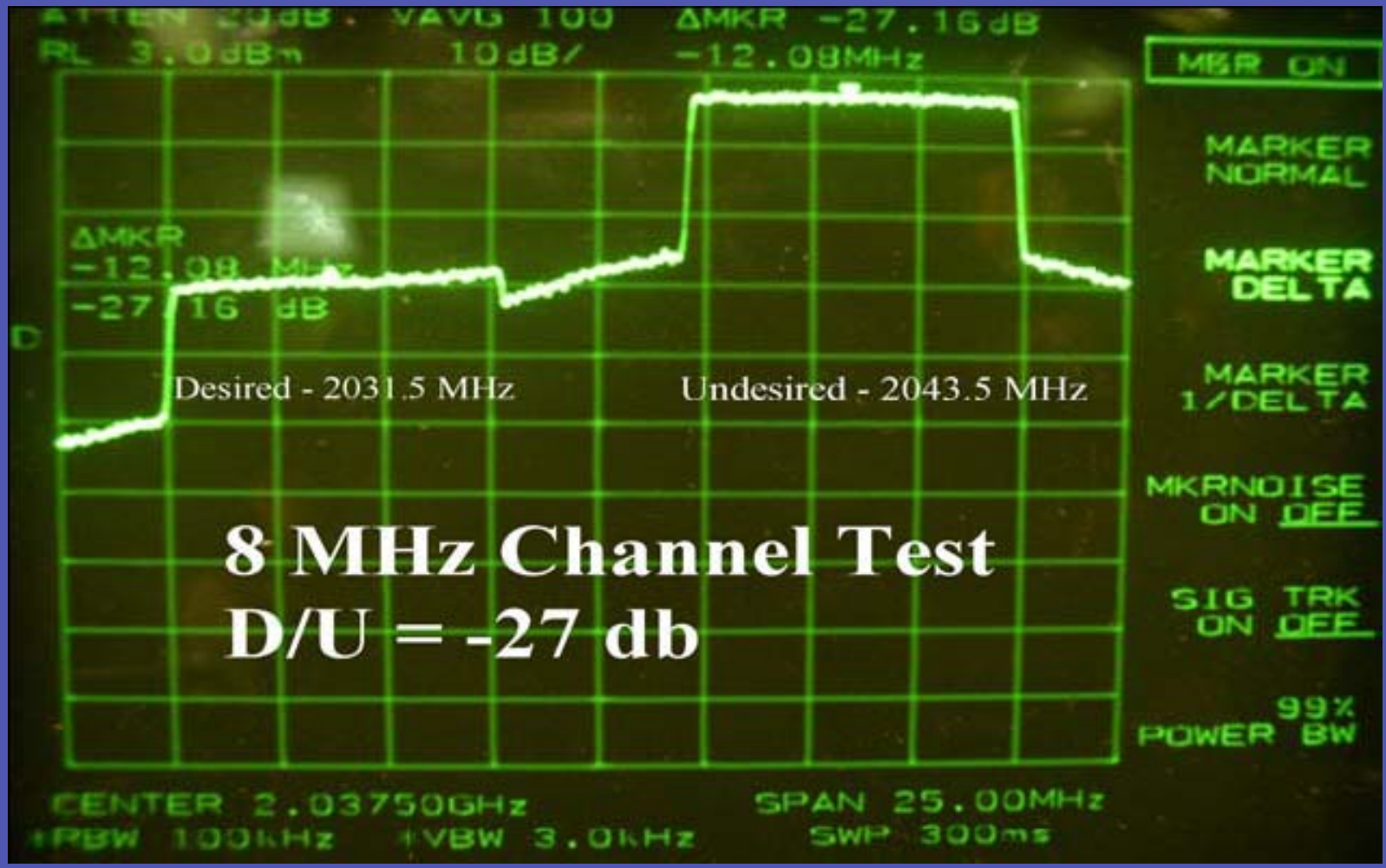


Figure 1 – Spectral Mask Points

Improved Adjacent Channel Interference Operation



2 GHz Project Progress

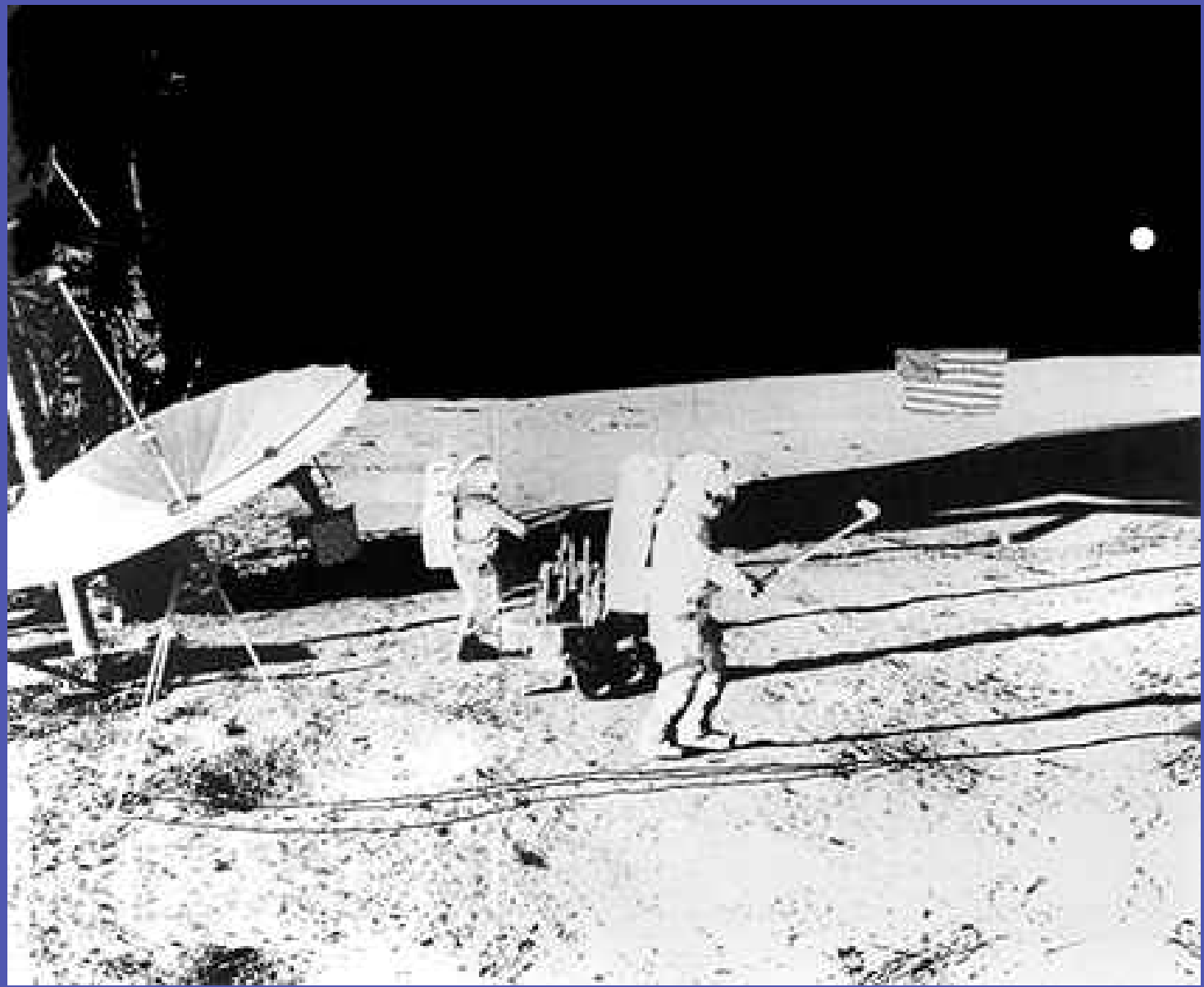
- Far from original estimates
- Agreements are much slower than expected
- No markets have been relocated; estimates were for 26 by this time.
- Equipment selection is taking longer than expected.
- Ultimate Sept 2007 Deadline?

Recommendations For ENG:

New expectations because everything is changing. (wm, mw, comms)
Tighter Coordination is needed

New equipment is needed

New operational parameters and guidelines are needed.



Very Little Congestion Here