



Spectrum Sell-Off Activities

Presented by

Mr. Derrick Hinton

Principal Deputy, Test Resource Management Center

at the

ITEA Test Instrumentation Workshop

Test and Training: Converging Solutions in the New Millennium

11 May 2011

Las Vegas, NV



Spectrum Stewardship

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Outline

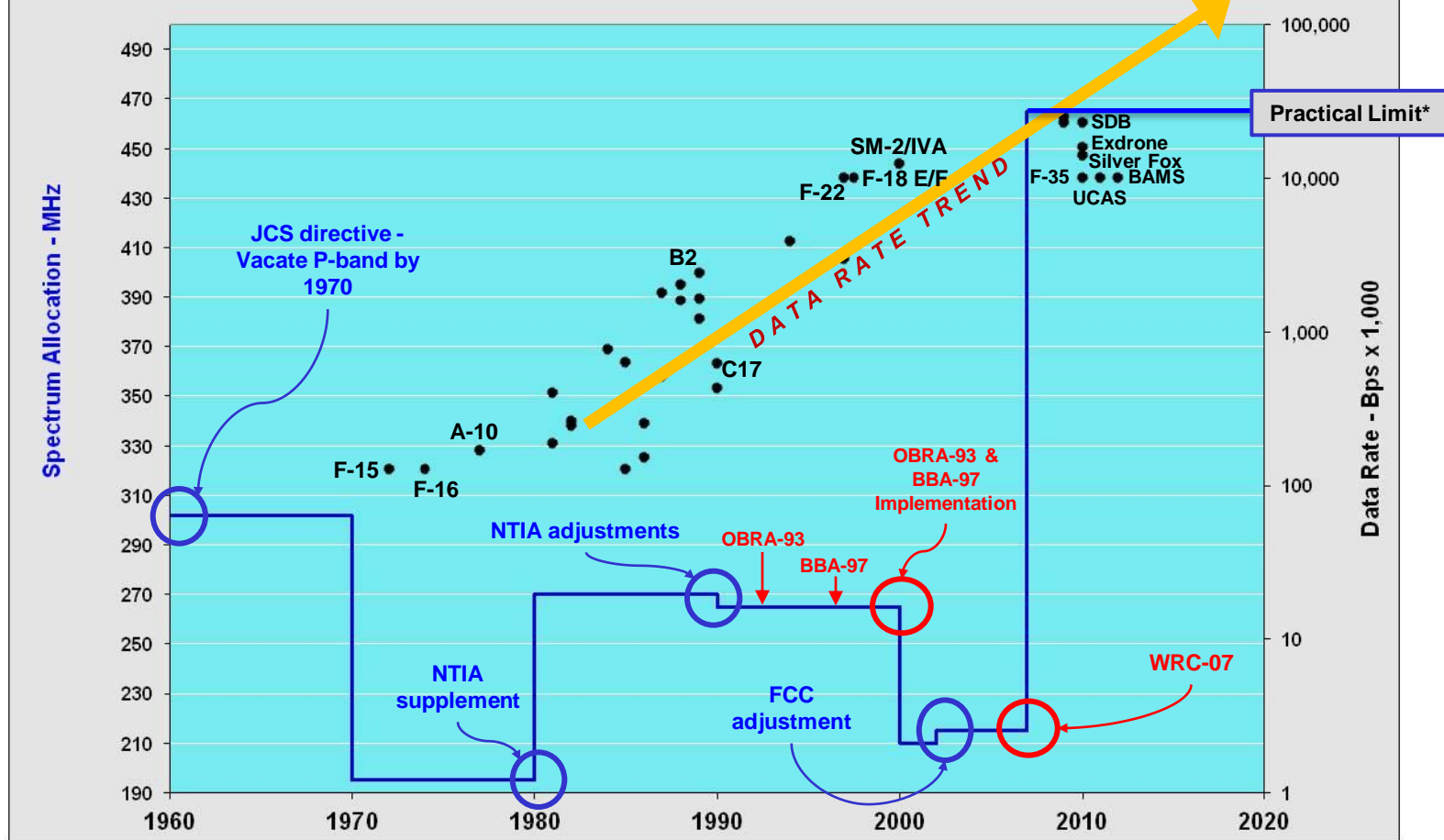


- Background
- Current Environment
- National Broadband Plan
- Other Challenges We Are Watching
- Current Efforts
- Summary



Background: Selected Example

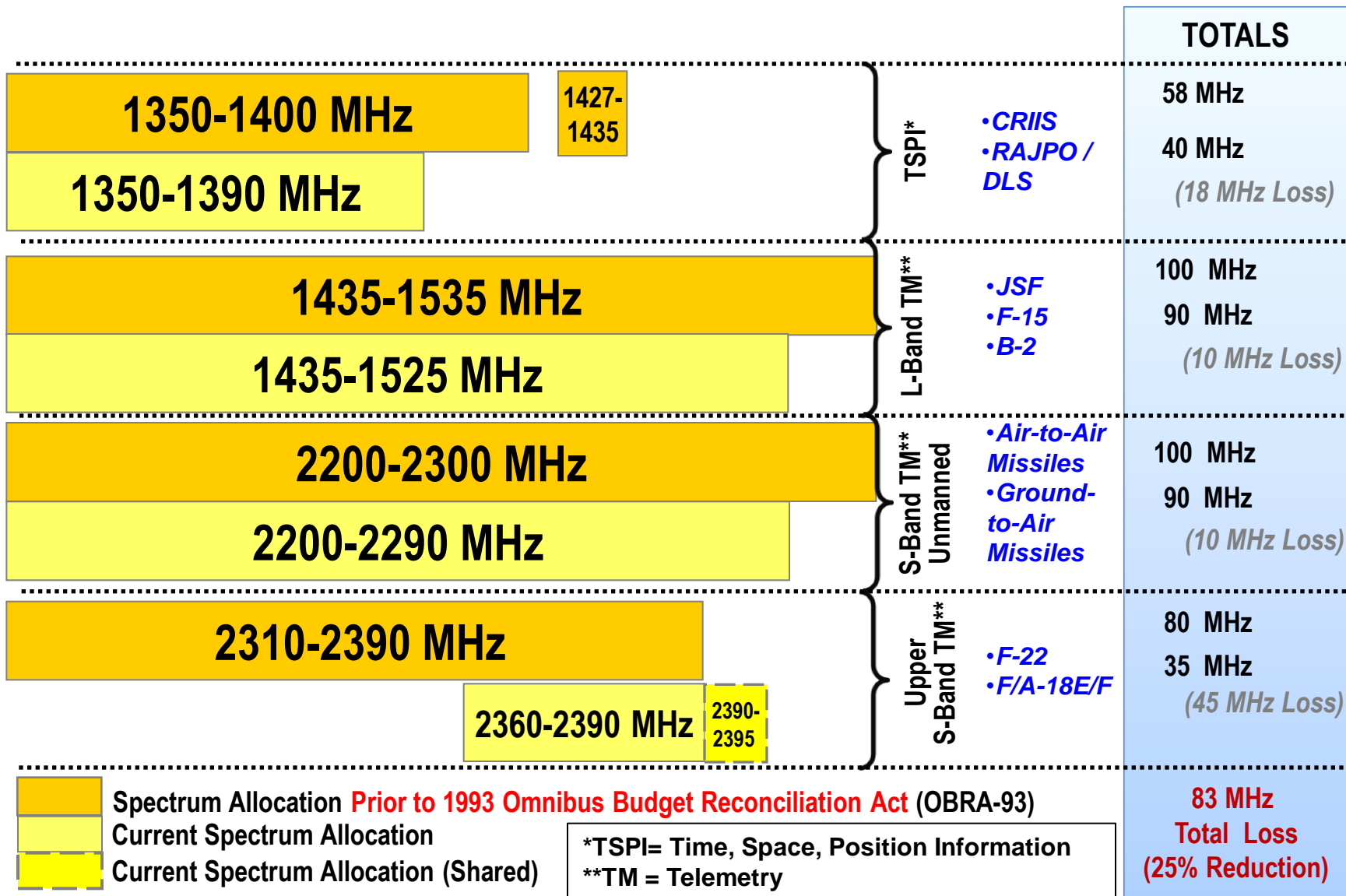
Telemetry Data Rate Trends vs. Spectrum Availability



* Although the Ranges obtained access to over 1.3 GHz of spectrum at WRC-2007, only about 200-250 MHz of this is available at any given range because of other users. Technology research may increase the amount of available spectrum by a factor of 2 to 3 (to 500-750 MHz).



Background: T&E Spectrum Losses 1993-2003



*TSPI= Time, Space, Position Information
 **TM = Telemetry



Current Environment: Substantial T&E Spectrum at Risk



- 2008 – New encroachment threats emerge
 - Medical telemetry, wireless services in adjacent bands
- 2009 – White House, Congress, FCC announce plans to seek up to 800 MHz of spectrum for wireless services
- 2010 – White House, Congress, FCC issue plans to seek 500 MHz of spectrum for wireless services
 - National Broadband Plan (NBP) requires 500 MHz of spectrum be reallocated from current users to wireless comm industry
 - Executive Memorandum directs agencies to identify 500 MHz to turn over to FCC or to share with wireless

The goal of NBP is for wireless industry and incumbents to share bands to greatest extent possible.



National Broadband Plan



- The Plan
 - “Repurpose” 500 MHz for broadband wireless services over ten years
- Process
 - Identify candidate bands – FCC & NTIA
 - Federal agencies work to President’s Ten Year Plan (TYP)
 - Assess candidate bands listed in TYP over next 3 years
 - NTIA sets assessment schedule
 - In DoD, MILDEPS assess, integrate at DOD CIO level, provide to NTIA
 - Ranges report up-channel through their command structure
 - NTIA and FCC coordinate on final band decisions
- Status
 - 1st band decision NLT 1 Oct 2011, all complete by mid-2014
 - No decisions yet on when systems must vacate



National Broadband Plan



- Candidate bands for the Broadband Initiative are:**

Frequency / Bands	Amount (MHz)	Current Allocation	T&E Usage
(Broadcast TV) VHF /UHF Frequencies	120	Non-Federal	
406.1-420	13.9	Federal	Yes
758-763 788-793	10	Non-Federal	
1300-1390	90	Federal	Yes
1525-1559 1626.5-1660.5	40	Non-Federal	
1610-1626.5 2483.5-2500	10	Non-Federal	
1675-1710	35	Shared	Yes
1755-1780	25	Federal	Yes
1780-1850	70	Federal	Yes
1915-1920 1995-2000	10	Non-Federal	
2000-2020 2180-2200	40	Non-Federal	
2020-2025	5	Non-Federal	
2155-2180	25	Non-Federal	
2200-2900	90	Federal	Yes
2305-2320 2345-2360	30	Non-Federal	
2700-2900	200	Federal	Yes
2900-3100	200	Shared	
3100-3500	400	Shared	Yes
3500-3650	150	Federal	
3700-4200	500	Non-Federal	
4200-4400 4200-4220 4380-4400	200	Shared	Yes
TOTAL	2263.9		

- Extensive impact and sharing studies underway by Ranges**
 - Very costly
 - Lead times for research & development is years if bands are lost
- Wireless industry wants these specific bands because of cost and performance:**
 - 1755-1850 MHz band matches the spectrum they got from us in 1990s (1710-1755)
 - 2200-2290 MHz band pairs well with 1710-1850 because industry can use same antennas & radios

Band critical for missile and missile defense T&E

Band critical for all unmanned vehicle testing, including missile and missile defense T&E. All DoD satellite C2.

Bands in yellow are used for various T&E purposes



National Broadband Plan: Potentially Adverse Impacts to T&E



- Outright loss of bandwidth
- Forced to share bandwidth
 - Increased crowding if other “losers” moved into existing T&E bands
 - Increased interference from wireless systems
 - In-band
 - Out-of-band (adjacent bands)

The goal of NBP is for wireless and incumbents to share bands to greatest extent possible. . . however . . . it is extremely difficult for wireless radio and T&E to share bandwidth.



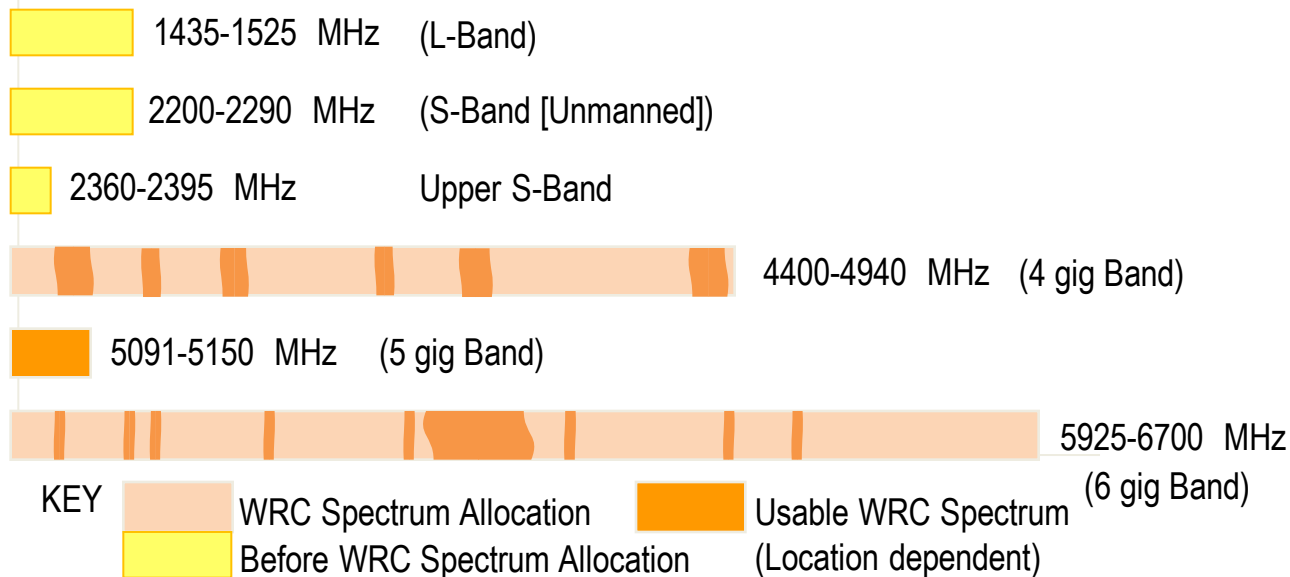
The News Is Not All Bad

- In 2003, we were successful in getting the Department to support the requirement for additional 650 MHz spectrum allocated for aeronautical telemetry
- We were successful in getting the U.S. ITU delegation to support that requirement going into WRC-07
- We came out of WRC-07 with an additional ~1.4 GHz spectrum allocated for aeronautical telemetry
- Even though we obtained international allocations for the C-Band at WRC-07, the DoD did not get “approval” to operate at those bands in the U.S. Even today, we do not have full access to those bands in the U.S.

***However, of the additional
~1.4 GHz of spectrum gained through WRC-07
only ~250 MHz
is usable for DoD aeronautical telemetry.***



T&E Telemetry Spectrum After 2007 World Radio Conference



TOTAL ACCESSABLE

90 MHz

90 MHz

35 MHz

~ 100 MHz

59 MHz

~90 MHz

~250 MHz
WRC bands
or
C-Band

Total = 464 MHz

NOTES

1. L-Band and Upper S-Band exclusively allocated for telemetry. There are no other users.
2. Unmanned S-Band shared with many other users, including DoD space C2.
3. 4 gig band is a DoD workhorse band. Shared with troposcatter, TDL, UAV, LAMPS, training systems, tactical comms, others
4. 5 gig band has almost no users, civil or Federal.
5. 6 gig band is all civil. Many thousands of VSATs and microwave systems. Every 7-11, utility, transportation system etc. Sharing is difficult and piecemeal.



Other Challenges We Are Watching: Medical Telemetry



Conflict with Telemetry Band

- GE Healthcare, Phillips, others seeking to operate thousands of low power devices in the 2360-2395 MHz telemetry band
 - Tests show devices could interfere
- AFTRCC, DOD, GE, Phillips developed sharing methodology and coordination criteria

Proposed Technical Solution

- Inside building, devices can transmit on any frequency; outside bldg., devices cannot operate, or can be switched by device control center to frequency above 2395 MHz
- Medical facilities within LOS of a range must register with range
 - Awaiting final FCC rulemaking approving agreement

***DoD in Partnership with Industry:
A Model for Future Sharing Agreements***



Other Challenges We Are Watching: WRC-12 Agenda Items



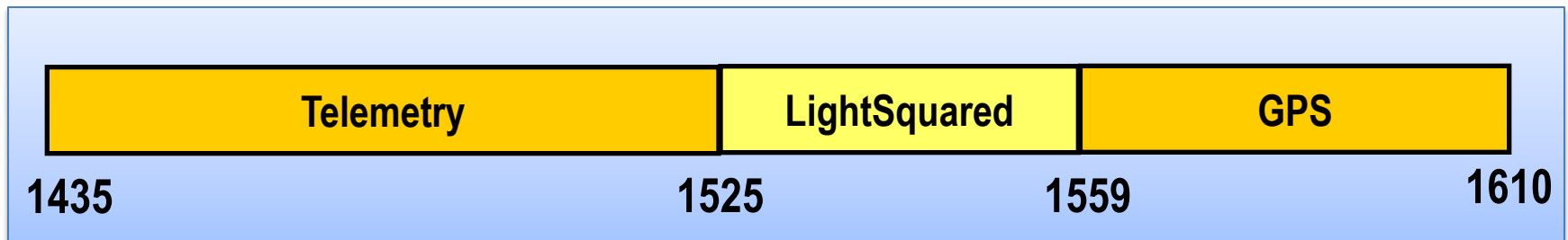
- **AI 1.3 – C2 for UAS flying in civil airspace**
 - U.S. proposing 5030-5091 MHz; Some countries still thinking about 5091-5150 MHz
- **AI 1.4 – Airport ground network for ground aircraft safety**
 - Designated co-primary with telemetry in 5091-5150 MHz at WRC-07
 - WRC-12 considering additional spectrum; U.S. proposes 5000-5010 MHz add
- **AI 1.5 – Electronic news gathering (ENG)**
 - ENG scattered across many bands; WRC trying to bring order to chaos
 - ENG often requests operations in telemetry bands
- **AI 1.25 – Expansion of mobile satellite services (MSS) into new bands, including 5150-5250 MHz**
 - U.S. study shows MSS OOB would cause severe interference in 5091-5150 MHz band; U.S. accordingly opposes MSS proposal
- **AI 8.2 – Additional broadband wireless allocations in 400-4400 MHz**
 - NTIA has proposed this as an agenda item for WRC-15
 - Not yet reconciled with FCC for U.S. proposal



Other Challenges We Are Watching: Other Systems in T&E Bands

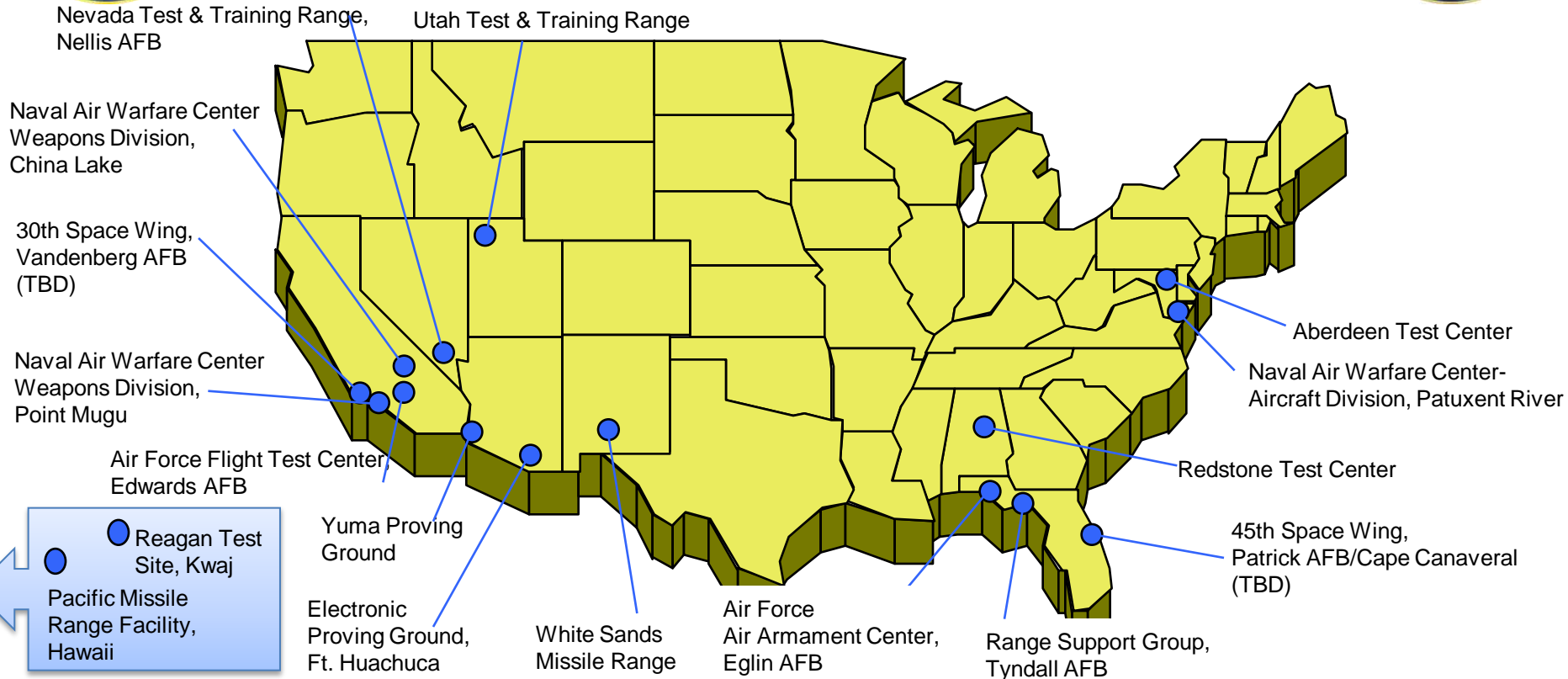


- **DoD and commercial systems that already possess, or are in the process of obtaining, frequency assignments in key DoD T&E bands**
 - LightSquared (4G terrestrial infrastructure) has gained approval to operate in a band adjacent to the GPS band and lower L telemetry bands. As proposed, this will interfere with GPS and telemetry operations.
 - Additionally, some (DoD) tactical systems are currently assigned to T&E bands. We are looking for ways to mitigate the potential impact to the DoD T&E community.





Current Efforts: The WRC Bands C-Band Implementation Initiative



- SES-level senior steering group oversees implementation
 - C-band working group comprising ranges provides technical, schedule integration
- Major C-band users: MDA (certain), F-22 (probable), Army & Navy missiles (certain)

Air Force Test Pilot School 1st operational C-band telemetry system



Summary



- The T&E community has experienced an exponential growth in data throughput requirements in order to carry out its mission, and this trend continues.
- The T&E community has experienced significant encroachment from the wireless communications industry, and this encroachment continues.

We have experienced some success in mitigating the impact to T&E spectrum, but we still have a lot of work to do.