DEPARTMENT OF THE TREASURY
1755 – 1850 MHz Relocation
Comparable Band
Phase III Report

I. INTRODUCTION

This report provides the inputs of the Department of the Treasury (Treasury) regarding the feasibility of vacating operations from the 1755 – 1850 MHz band.

Treasury supports the administration's goal of making available 500 MHz of spectrum for use by commercial carriers for a national broadband system. The potential bands identified by NTIA following Treasury's April 1, 2011 Comparable Bands Assessment were the 2200-2290 MHz, 1675-1695 MHz and 1435-1525 MHz bands.

Treasury currently has frequency authorizations for video surveillance in four frequency bands: 1755 – 1850 MHz, 2200 – 2290 MHz, 4400 – 4940 MHz; and the 8 GHz band. Of these bands, the band with the most similar propagation characteristics to the 1.7 GHz band is the 2200 – 2290 MHz band. The signal loss experienced in the higher bands make them much less favorable than the 2.2 GHz band. Systems operating in higher bands decrease operating distances and increase the need for relays and directional antennas. The reduced distances and the need for additional relays and directional antennas make the higher bands poor replacements for the 1.7 GHz band.

The band preferred by Treasury is the 2200 – 2290 MHz band. The 2200-2290 MHz band is the only band where manufacturers are currently producing video surveillance equipment, but it is currently very congested and will likely get much more congested when the other Federal operations relocate to this band. In an effort to coordinate with incumbent users of the band, Treasury forwarded information on its technical characteristics and operations plans to NASA, NOAA and DOE to aid in their analysis of the expansion of Treasury's technical investigations operations in the 2200 – 2290 MHz band. The possibility of deploying video surveillance into the other bands depends on the availability of funding and manufacture of equipment to support this function.

Similar to the Departments of the Justice and Homeland Security, Treasury will make every effort to vacate the band completely within 5 years, but in order to ensure our law enforcement operations are not compromised, Treasury plans on vacating the 1755 – 1850 MHz band over a 10 year period.

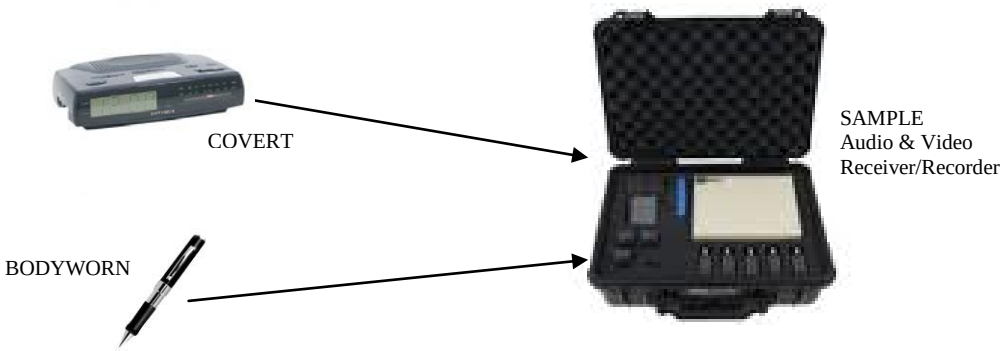
The total projected cost for Treasury to relocate from the 1755-1850 MHz band is $19.96 million.

II. CURRENT OPERATIONS

Two bureaus within the Department of the Treasury (Internal Revenue Service – Criminal Investigations (IRS – CI) and the Treasury Inspector General for Tax Administration (TIGTA)) utilize this band for covert/body-worn audio and video surveillance for evidence collection during administrative and/or criminal investigations. These systems are primarily mounted on outdoor light posts and electrical poles; installed covertly in offices and cubicles; or worn by undercover agents and/or cooperating witnesses. Treasury currently operates approximately 120

transmitters in the 1755 – 1850 MHz band. To restore full comparable capability; however, the total number of devices needing replacement, including receivers, repeaters, and antennas, total about 600.

Both Treasury bureaus are using current Spectrum Relocation Funds (SRF) to convert most of the current "pole cams" to IP-based systems accessible through the internet. IP systems are ideal for longer-term and stationary use, but Treasury still requires use of covert and body-worn video surveillance systems for shorter-term, "on-the-fly" requirements. Manufactures of these systems are still in the process of converting from analog to digital, consequently, current procurements are, and for the foreseeable future, will continue to be a mix of analog and digital systems.



TYPICAL COVERT SURVEILLANCE CONFIGURATION

These systems may be employed "anytime, anywhere" and are used for collecting potential evidence during criminal and administrative investigations. Systems may be operational for a meeting, typically a few hours, or may be employed to surveil and record activity at a business over several weeks or months.

These systems are normally maintained at TIGTA and IRS-CI field divisions/offices around the country and may be used at any time. They may be used two to three times per month for one to two days on average. The larger field divisions/offices, i.e., New York, Los Angeles, etc. are much more active and some others are much less.

Treasury currently has nine US&P frequency assignments in the 1755 – 1850 MHz band and does not utilize fixed microwave links or airborne video surveillance systems.

Frequency	No. of Assignments	Power	Emission Bandwidth	Type of Operation
TIGTA	Six	3 watts	6M00C3F	Anytime, Anywhere
IRS-CI	Three	5 watts	6M00C3F	Anytime, Anywhere

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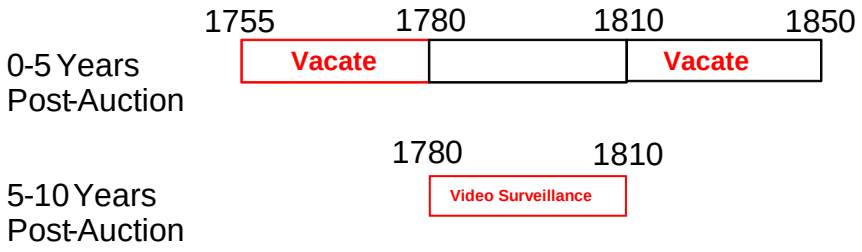
III. TRANSITION PLAN/TIMELINE

Treasury plans on following the same transition as the DOJ and DHS, but may be able to complete the transition sooner. The phase out of the exit from 1755 – 1850 MHz would allow some operations in the affected band in the event the transition to the 2200 – 2300 MHz is delayed. We will plan on vacating the band as follows:



Treasury will make every effort to vacate the band earlier, but to ensure that current law enforcement activities do not suffer, we will plan on continuing to use our current frequencies in the 1780 – 1810 MHz band for up to 10 years if necessary.

IV. DRAFT COST ESTIMATES

It is extremely difficult to prepare accurate estimates for the later stages of this plan because it requires forecasting the evolving state of surveillance technology and predicting the costs of such evolution 10 years out.

Treasury predicts the total costs relocation from the 1755-1850 MHz band will be about $20 million (see attachment 1). These estimates are significantly higher than the 2007 estimate because the equipment has to be discarded and new equipment procured. During the previous relocation effort, the channelized equipment was able to continue operations on channels outside the 1710 – 1755 MHz band and Treasury was able to continue utilizing antennas, receivers, recorders, etc. These estimates are for the procurement of the new systems and alternate technologies to provide comparable capability.

These rough estimates includes recurring commercial service costs (cable, DSL, cellular data costs, which will be a recurring cost each year), costs to procure replacement systems, including new cameras, transmitters, receivers, antennas, recorders and associated training and documentation for the new systems and costs to dispose of the old equipment. Also included in the cost estimate is 10 years worth of commercial service fees and 10 years worth of training costs. It also includes operations and maintenance costs which represent major cost increases Treasury will incur as a result of any spectrum relocation. These increased costs will be a reality for the lifecycle of the relocated operations and compensation should be considered through either the spectrum relocation fund (SRF) or through the annual budget process.

V. CONCLUSION

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Treasury may be able to cease use of the 1755 – 1850 MHz band in five years, but needs to maintain use of a portion of the band for up to 10 years to restore full capability. The evolution of video surveillance technology and prudent fiscal management “may” require procurements that take longer than 5 years, i.e., Treasury does not want to procure equipment in first 5 years and discover clearer, more spectrally efficient and less expensive devices are available in years 6 through 10.

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Internal Revenue Service – Criminal Investigations
Relocation Cost Estimates

Spectrum Relocation Long Term Cost Estimate						
		FY-14 thru 18		FY-19 thru 22		
Requirements	Amount	Qty	Phase 1 Costs	Qty	Phase 2 Costs	Notes
Broadband Service	$275K	5 Years	$1,375,000.00	5 Years	$1,375,000.00	Recurring Fees
Training	$100K	5 Years	$500,000.00	5 Years	$500,000.00	
IP Storage Systems	$20K	50	$1,000,000.00	50	$1,000,000.00	Recurring Cost - 5 Year life on Systems & New Technology
Ultra Narrow Band RF Systems	$40K	50	$2,000,000.00	50	$2,000,000.00	400 Total - Split between Phase 1 & 2 to allow for new technology
Covert Surveillance Systems w/Rx Kit	$55K	40	$2,200,000.00	40	$2,200,000.00	120 Total - Split between Phase 1 & 2 to allow for new technology
IP Surveillance Systems	$30K	60	$1,800,000.00	60	$1,800,000.00	100 Total - Split between Phase 1 & 2 to allow for new technology
Total Costs			**$8,875,000.00**		**$8,875,000.00**	**$17,750,000.00**

Attachment 1

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Treasury Inspector General for Tax Administration
Relocation Cost Estimates

Spectrum Relocation Long Term Cost Estimate						
		FY-14 thru 18		FY-19 thru 22		
Requirements	Amount	Qty	Phase 1 Costs	Qty	Phase 2 Costs	Notes
Broadband Service	$30K	5 Years	$150,000.00	5 Years	$150,000.00	Recurring Fees
Training	$21K	5 Years	$105,000.00	5 Years	$105,000.00	
IP Storage Systems	$11K	6	$66,000.00	6	$66,000.00	Recurring Cost - 5 Year life on Systems & New Technology
Ultra Narrow Band RF Systems	$40K	7	$280,000.00	7	$280,000.00	400 Total - Split between Phase 1 & 2 to allow for new technology
Covert Surveillance Sytems w/Rx Kit	$55K	7	$385,000.00	7	$385,000.00	120 Total - Split between Phase 1 & 2 to allow for new technology
IP Surveillance Sytems	$20K	6	$120,000.00	6	$120,000.00	100 Total - Split between Phase 1 & 2 to allow for new technology
Total Costs			**$1,106,000.00**		**$1,106,000.00**	**$2,212,000.00**

Attachment 1 (cont'd)

Technical Characteristics of Digital Systems Planned for 2200-2290 MHz Band Operations

Parameter	Value
System	
Brief Description of System	Treasury operates a nationwide system of covert portable and mobile video surveillance devices that support Federal law enforcement investigations and protection details. These systems are used to perform administrative and criminal investigations. Agents utilize multiple transmitters and receivers, along with relays and recorders, to collect, transport, and store video and audio evidentiary information. These systems are employed whenever and wherever this information is required in support of investigations. Treasury employs body-worn, covert and "pole cam" devices in this band which require that these devices be highly portable and highly concealable.
Multiple transmitters and/or receivers?	YES
System Deployment	
Geographic Area(s) of Operation. Indoor/outdoor operation?	US&P; both indoor and outdoor
Provide data below for each transmitter/receiver in system	
Transmitter	
Emission 3 dB Bandwidth (MHz) [i]	8 MHz
Power (dBW) Peak[ii] Average	 Up to +30 dBm peak Up to +30 dBm average
Duty Cycle (%)	100 %
*Emission Spectrum[iii] (Relative Attenuation (dB) as a Function of Frequency Offset from Center Frequency (MHz))	Attenuation Frequency Offset 25 dB 4 MHz 35 dB 8 MHz 43 dB 20 MHz
*Emission Roll-Off (dB/decade)	20 dB/decade
Antenna Gain (Mainbeam) (dBi)[iv]	2.15 dBi
Azimuth Off-Axis Antenna Pattern (dBi as a function of off-axis angle in degrees)[v]	0 dB
Elevation Off-Axis Antenna Pattern (dBi as a function of off-axis angle in degrees)	0 dB
*Polarization	Linear
Cable, Insertion, or Other Losses (dB) [vi]	N/A
Transmitter location(s); geographic area of operation	Portable transmitters operating

	anywhere in the US&P
Transmitter antenna boresight pointing	NA
Transmitter antenna height (m)	Ground level (2M) and greater
Receiver	
Receiver 3 dB Intermediate Frequency (IF) Bandwidth (MHz)	Matched to TX bandwidth
*Receiver IF Selectivity (Relative Attenuation (dB) as a Function of Frequency Offset from Center Frequency (MHz))[vii]	Attenuation Frequency Offset 20 dB 10 MHz 60 dB >= 15 MHz
Receiver Noise Figure (dB) or Receiver Temperature (K)	4 dB
Antenna Gain (Mainbeam) (dBi)	2.15 dBi (dipole)
Azimuth Off-Axis Antenna Pattern (dBi as a function of off-axis angle in degrees)	Dipole characteristics
Elevation Off-Axis Antenna Pattern (dBi as a function of off-axis angle in degrees)	Dipole characteristics
Polarization	Linear
Cable, Insertion, or Other Losses (dB)	0.5 dB
Interference Criteria Interference to Noise Ratio (dB) *Signal-to-Noise-Plus-Interference (dB) Percentage of time that above criteria may be exceeded (%)	 Signal to noise can be estimated from data in the end note viii; however, unclear what is meant by interference to noise Ratio. 0 percent
*Interference Threshold (dBW)[viii]	Varies depending on receiver mode of operation, interference characteristics, and measure-ment method. See endnote for additional information.
Receiver location(s)	US&P, no aircraft use
Receiver antenna boresight pointing	NA
Receiver antenna height (m)	2m or greater (limited by surrounding structures

* Optional: only provide if readily available

[ii] Transmitters operate on a continuous basis at power levels up to 1 watt. Modulation peak to average per COFDM sub-carrier would align with QPSK, 16QAM and 64QAM theoretical limits.
[iii] FCC required spectral mask
[iv] Antennas are dipole but in close proximity to conductive materials with potential to distort radiation pattern
[v] Antennas subject to operating at various angles depending upon application
[vi] Antenna integrated with transmitter
[vii] Selectivity based on interfering signal modulation format similar to desired signal modulation format.