

CSMAC Working Group 4

1755-1850 MHz

Point-to-Point Microwave

Tactical Radio Relay (TRR)

Joint Tactical Radio System (JTRS)

Draft Report

For Discussion at the CSMAC Meeting on June 18, 2013

Recommendations

Point-to-Point Microwave

- Relocate point-to-point microwave systems per NTIA report.
- Prioritize systems for relocation to correspond with commercial system deployment as feasible.
 - Spectrum: concentrate on 1755-1780 MHz band initially
 - Locations: consider the list of industry-defined Economic Areas (EAs) according to industry's geographic implementation priorities, noting that exact order in which agencies will be able to relocate based on their operational requirements and may vary from the commercial deployment priority.
- Use Transitional Sharing approach from AWS-1 to permit deployment before systems are relocated.
 - Use TSB-10F interference analysis methodologies and objectives.
 - Use coordination procedures developed for AWS-1.*

* See, 47CFR § 27.1134 *Protection of Federal Government operations* and FCC 06-50, April 20, 2006.

Recommendations

TRR

- Relocate/compress systems as indicated in NTIA Report.
 - Need to establish mutually-agreeable time frames.
- Prioritize systems for relocation to correspond with commercial system deployment as feasible.
 - Spectrum: concentrate on 1755-1780 MHz band initially.
 - Locations: consider the list of industry-defined EAs according to industry's geographic implementation priorities, noting that exact order in which DOD will be able to relocate based on their operational requirements and may vary from the commercial deployment priority.
- Establish TRR Protection Zones for the entire 1755-1850 MHz band at highest priority DOD training installations/locations to minimize impacts to operational training requirements:

Continuing Army TRR Locations

Fort Irwin, CA
Fort Polk, LA
Fort Bliss, TX and WSMR
Fort Hood, TX
Fort Bragg, NC (Includes Camp MacKall)
Yuma Proving Ground , AZ

Continuing USN/USMC TRR Locations

Bogue Field, NC
Panama City, FL
MCAS Yuma, AZ
Twenty-Nine Palms, CA
MCB Camp Pendleton, CA
MCB Hawaii (Kaneohe Bay), HI
Apra Harbor, Guam

Recommendations

TRR

- Perform Protection Zone analyses for all locations as necessary.
 - See “Recommended Future Work”.
- Develop Transition Plans that address relocation of assignments, compression above 1780 MHz and comparable spectrum.
- Develop a Transitional Sharing approach to permit deployment in Protection Zones before systems are relocated.
 - Develop interference analysis methodologies and objectives.
 - Develop coordination procedures similar to AWS-1.
 - Commercial licensees shall be required to coordinate any operations that could permit mobile, fixed, and portable stations to operate in the specified Protection Zones
 - Protection of these facilities in this manner shall continue until such time as these systems are relocated to other spectrum or compressed above 1780 MHz.
 - Establish a process to ensure that in the event of interference that can be sourced to commercial wireless operations, wireless operators modify operations in the band to mitigate interference until sources are identified and resolved.

Recommendations

TRR

- Share the entire 1755-1850 MHz band in regions where there is no commercial interest based upon auction outcomes.
- Develop a testing program to demonstrate the viability and effectiveness of interference protection/mitigation methods before commercial licensees commence deployments in Protection Zones.

Recommendations

JTRS

- Establish JTRS Protection Zones for the 1755-1850 MHz band at highest priority DOD training installations/locations to minimize impacts to operational training requirements:

Continuing Army JTRS Locations

Fort Irwin, CA

Fort Polk, LA

Fort Bliss, TX and WSMR

Fort Hood, TX

Fort Bragg, NC (Includes Camp MacKall)

Yuma Proving Ground , AZ

- For all other locations, compress systems above 1780 MHz as indicated in May 21, 2013 update.
 - Time frames to compress should be established in concert with commercial deployment time frames.
 - Actual system tuning above 1780 MHz occasioned upon request from commercial licensee to access area within Protection Zone (see next slide).
- Perform Protection Zone analyses for all locations as necessary.
 - See “Recommended Future Work”.

Recommendations

JTRS

- Share the entire 1755-1850 MHz band in regions where there is no commercial interest based upon auction outcomes.
- Develop a Transitional Sharing approach to permit deployment in Protection Zones
 - Develop interference analysis methodologies and objectives.
 - Develop coordination procedures similar to AWS-1.
 - Licensees shall be required to coordinate any operations that could permit mobile, fixed, and portable stations to operate in the specified Protection Zones
 - Protection of these facilities in this manner shall continue until such time as these systems are compressed above 1780 MHz.
 - Establish a process to ensure that in the event of interference that can be sourced to commercial wireless operations, wireless operators modify operations in the band to mitigate interference until sources are identified and resolved.
- Develop a testing program to demonstrate the viability and effectiveness of interference protection/mitigation methods before commercial licensees commence deployments in Protection Zones.

Recommendations

Future Work

- In the context of a national level effort, explore Protection Zone analysis methods in addition to those employed by WG4 (i.e. worst case); study the following (with a goal of improving on worst case):
 - Interference protection criteria
 - Impact of clutter
 - Use of antenna effects
 - Effects of operational tempo
- Run analyses for all TRR sites and for JTRS sites that have been identified as needing long term access to the 1755-1850 band.
- Establish a process to share data (e.g., assignments, operational characteristics, technical parameters, etc.).
 - The WG notes that this issue applies across all WGs.

Background

TRR Background

From NTIA Report*

- DOD can vacate all of its TRR systems in the 1755-1850 MHz band within 10 years if comparable spectrum is provided and costs are addressed.
 - Army (HCLOS) can accommodate commercial broadband systems in the 1755-1780 MHz band within 5 years.
 - Army can share with commercial broadband systems during the 5-year period (Transitional Sharing).
 - Navy can share with commercial broadband systems during this 5-year period (Transitional Sharing) at all other locations.
 - Navy and Marine Corps (DWTS) can accommodate commercial broadband systems in the 1755-1780 MHz band within 5 years as a transition step to 10 year relocation, but will require protection zones at critical test and training locations.

Continuing USN/USMC TRR Locations

Bogue Field, NC

Panama City, FL

MCB Camp Pendleton, CA

MCB Hawaii (Kaneohe Bay), HI

Apra Harbor, Guam

* See, “An Assessment of the Viability of Accommodating Wireless Broadband in the 1755 – 1850 MHz Band” (NTIA Report), NTIA, March 2012, pp26-27.

TRR Background

From NTIA Report

- At remaining locations, either compress above 1780 MHz if feasible to fit assignments in the 1755-1780 MHz band into the upper 70 MHz.
 - Any compression above 1780 MHz requires access to comparable spectrum (2025-2110 MHz and 2200-2290, 4400-4490 MHz as fallback).
- Or relocate out of the 1755-1850 MHz band to identified comparable spectrum.
 - Requires 2025-2110 MHz and 2200-2290 MHz/4400-4490 MHz noting ship-to-shore TRR can only tune to 1350-1850 MHz.

TRR Background

Update from DOD

- DOD informed WG on May 21, 2013 of the following approach:
 - Establish protection zones for the entire 1755-1850 MHz band at the following highest priority training locations to minimize impacts to operational training requirements:

Continuing Army TRR Locations **(added)**

Fort Irwin, CA

Fort Polk, LA

Fort Bliss, TX and WSMR

Fort Hood, TX

Fort Bragg, NC (Includes Camp MacKall)

Yuma Proving Ground , AZ

Continuing USN/USMC TRR Locations

Bogue Field, NC

Panama City, FL

MCAS Yuma, AZ **(added)**

Twenty-Nine Palms, CA **(added)**

MCB Camp Pendleton, CA

MCB Hawaii (Kaneohe Bay), HI

Apra Harbor, Guam

TRR Background

Update from DOD

- Replace Army National Guard statewide assignments with point or local area assignments:

	<u>Originally Reported (5)</u>		<u>Added (38)</u>
Iowa	Cedar Rapids, Johnston	Arizona	Casa Grande, Papago Mine, Chandler, Marana, Phoenix
Ohio	Newark, Springfield, Columbus	Indiana	Elwood, Anderson, Greenfield, Indianapolis
		Illinois	Chicago, Carbondale, Crestwood, Marion, Kewanee, North Riverside, Springfield
		Michigan	Adrian, Augusta, Wyoming
		Mississippi	Meridian, Camp Shelby
		Missouri	Warrensburg, Whiteman, Kansas City, Saint Joseph, Fort Leonard Wood
		North Dakota	Fargo, Devils Lake
		Oklahoma	Norman, Mustang, Oklahoma City
		New Hampshire	Manchester, Strafford
		Pennsylvania	York, Johnstown, Tobyhanna, Harrisburg, Annville

TRR Background

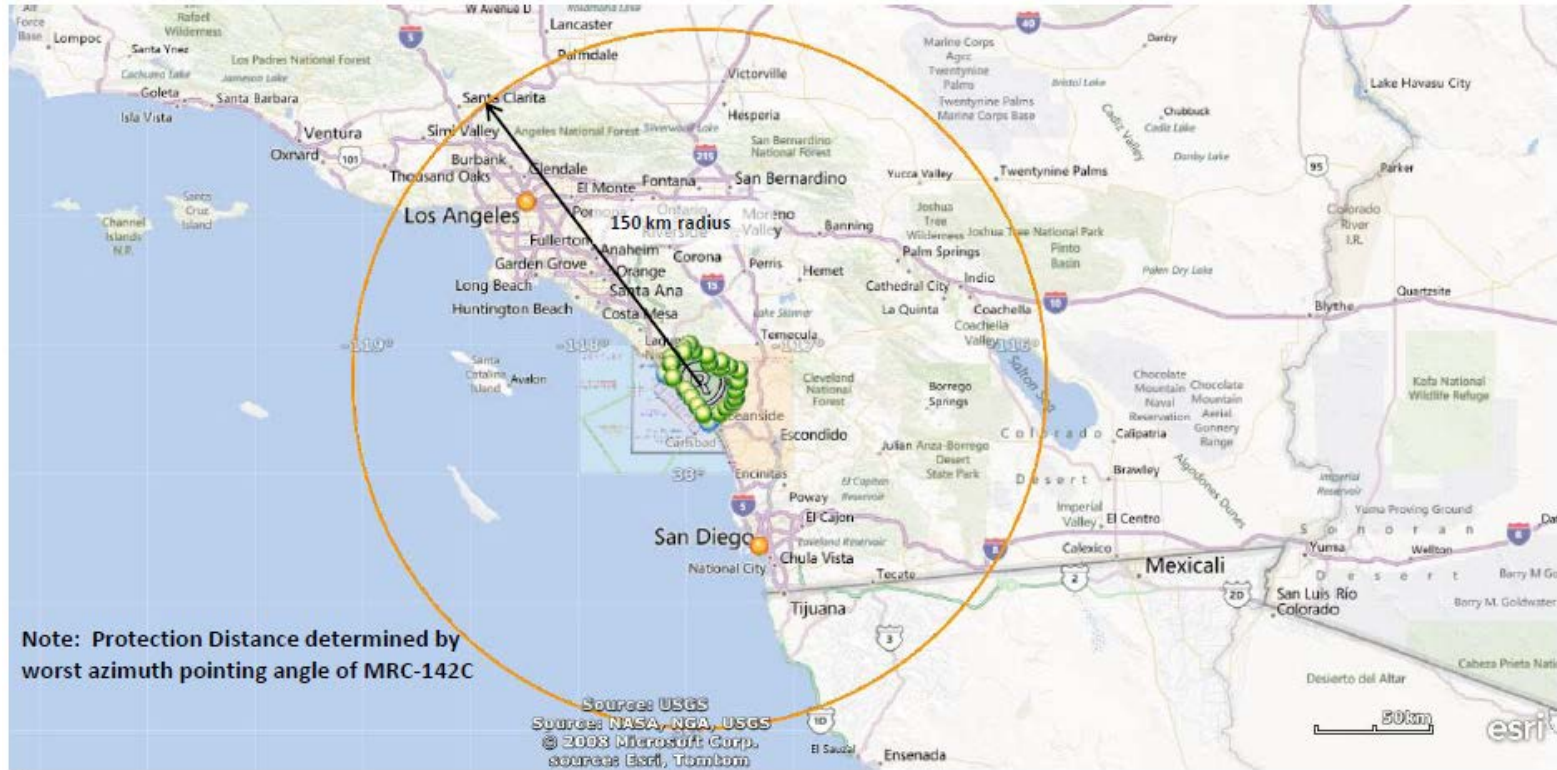
Protection Zone Analysis

- Protection Zone analyses were performed for four agreed representative TRR sites (three for Army and one for Navy/USMC) out of close to 100 total TRR sites.
 - Ft. Lewis, WA; Camp Blanding, FL; Ft. Carson, CO; Camp Pendleton, CA
- Analyses were performed using worst-case assumptions.
 - Worst-case antenna azimuth pointing angle
 - No contribution to path loss from clutter
 - Used threshold degradation as interference criteria
- Temporal sharing was not studied due to information on government operational time frames is not releasable to the public.
- No information provided on assignments above and below 1780 MHz, so could not address sharing approaches that make that lower band (1755-1780 MHz) available first.
- Based upon analyses results, the WG feels that analysis of remaining locations may yield Protection Zones that encumber major market areas.
 - Analyses results show Seattle and So CA completely encumbered.

TRR Background

Protection Zone Analysis

Protection Distance Assessment at Camp Pendleton
Interference to MRC-142C from LTE Handsets



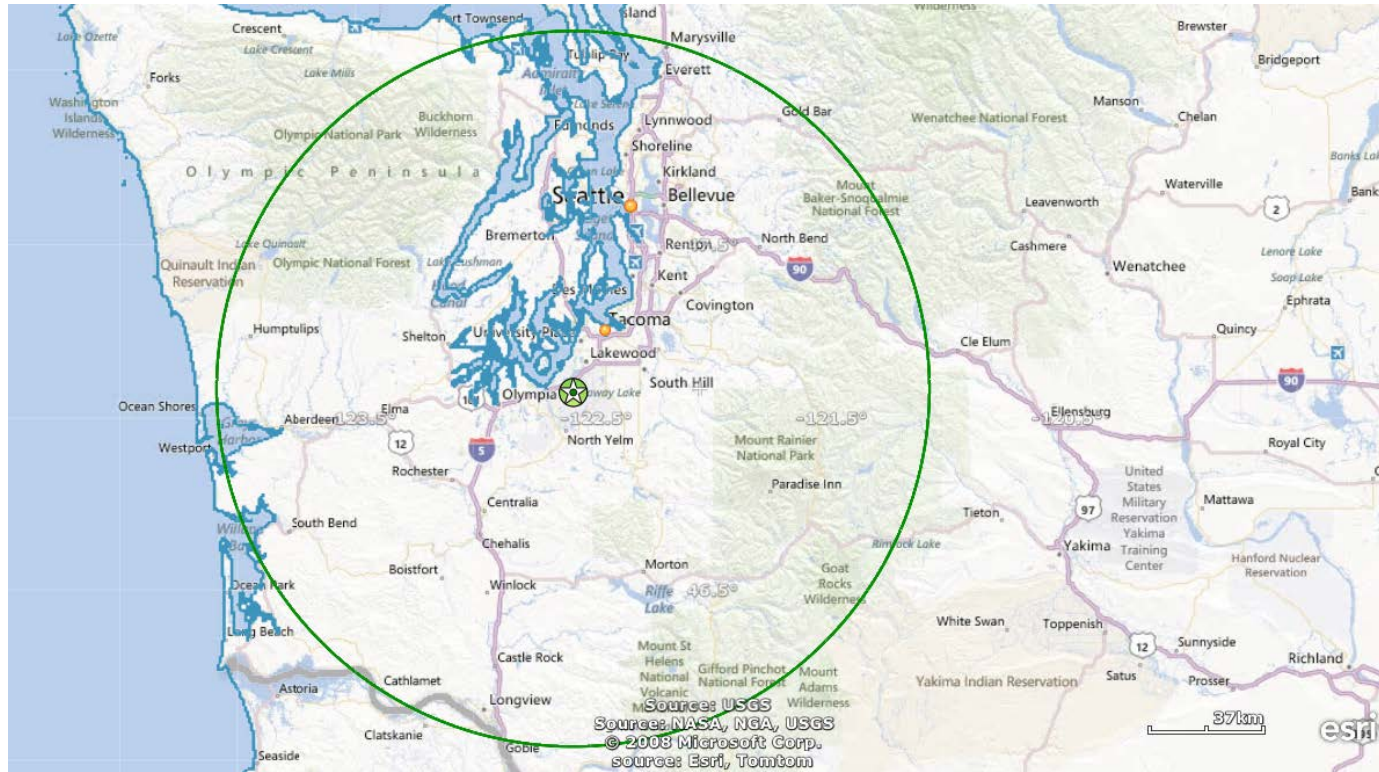
Interference to MRC-142C from LTE Handsets

TRR Site		Victim System	Propagation Model	I/N Threshold (dB)	Clutter (dB)	Center Coordinates	Worst-Case Protection Distance Radius (km)
Name	Approx. Size (width x length) (km)						
Camp Pendleton	35 x 40	MRC-142C	ITM (50%)	-6	0	332125N, 117262W	150

TRR Background

Protection Zone Analysis

Protection Distance Assessment at Fort Lewis



Interference to Army TRR from LTE Handsets

TRR Site		Propagation Model	I/N Threshold (dB)	Clutter (dB)	Protection Distance Radius (km)
Name	Approx. Size (width x length) (km)				Center Coordinates
Fort Lewis	21 x 19	ITM (50%)	-6	0	115

	CSMAC WG2 Top 100 Market City
	TRR Site Perimeter
	TRR Site Center Coordinate
O	TRR at Base Center Protection Distance Radius (km)

JTRS Background

From NTIA Report*

- DOD can accommodate commercial broadband systems in the 1755-1850 MHz band within 5 years.
- However, will require Protection Zones at 28 locations.
- Operations must remain in the band indefinitely for JTRS operations at other (ground-based) locations.
- Compression of operations into the 1780-1850 MHz band is technically feasible in low-density environments.
- There is no applicable cost to relocate SDR systems since they can't relocate to comparable spectrum.

* See NTIA Report, p42.

JTRS Background

Update from DOD

- DOD informed WG on May 21, 2013 of the following approach:
 - Establish protection zones for the entire 1755-1850 MHz band at following locations:

Continuing Army JTRS Locations

Fort Irwin, CA

Fort Polk, LA

Fort Bliss, TX and WSMR

Fort Hood, TX

Fort Bragg, NC (Includes Camp MacKall)

Yuma Proving Ground , AZ

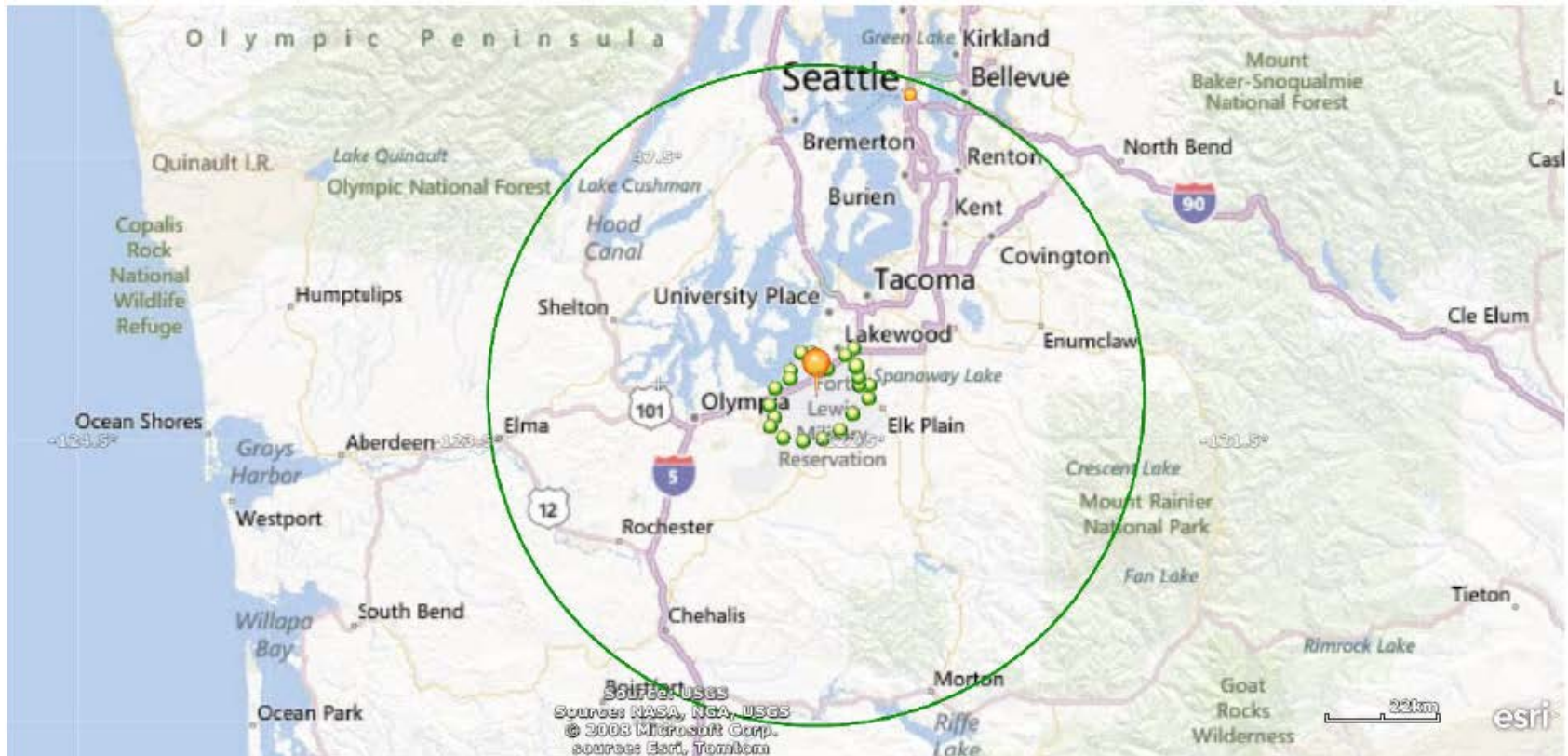
- Elsewhere, can compress above 1780 MHz without requiring new spectrum assignments to replace the ones in the 1755-1780 MHz band.

JTRS Background

Protection Zone Analysis





- Protection Zone analyses were performed for three agreed representative JTRS sites out of 28 total.
 - Ft. Lewis, WA; Camp Blanding, FL; Ft. Carson, CO
- JTRS data is FOUO
 - No data on frequency assignment counts and other operational parameters available.
- Analyses were performed using worst-case assumptions.
 - Worst-case antenna azimuth pointing angle
 - No contribution to path loss from clutter
 - Used threshold degradation as interference criteria
- Based upon analyses results, the WG feels that analysis of remaining locations may yield Protection Zones that encumber major market areas.
 - Analysis results show Seattle substantially encumbered.

JTRS Background Protection Zone Analysis



Interference to Ground-Based JTRS from LTE Handsets

JTRS Site		Center Coordinates	Propagation Model	I/N Threshold (dB)	Clutter (dB)	JTRS Protection Distance (km)
Name	Approx. Size (width x length) (km)					From Center Coordinate
Fort Lewis	21 x 19	47° 4'30.00"N, 122°34'30.00"W	ITM (50%)	-6	0	65

	Top 100 Market City
	JTRS Site Perimeter
	JTRS Site Center Coordinate
	Protection Distance From Center Coordinate (km)

Schedule

- Draft Final Report Completion for Circulation: June 22
- Comments Due: June 29
- Final Report: July 13