

Everett, WA ESV Interference Analysis
Prepared for Intelsat

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Section 1: ESV Parameters

An interference analysis to determine the interference potential from of a C-band Earth Station onboard Vessel (ESV) has been performed for the Everett, WA area. The analysis considers a port-side location in Everett and the ESV approach route out to a distance 200 km from the shoreline. The Earth Station operating parameters are shown in Table 1 below. Table 2 below lists the breakpoints of the ESV approach route, as shown in Figure 1 below:

SATELLITE EARTH STATION FREQUENCY COORDINATION DATA			
		Company	INTELSAT ESV
Earth Station Name, State		EVERETT, WA	
Latitude (DMS) (NAD83)		47 59 6.0 N	
Longitude (DMS) (NAD83)		122 13 35.0 W	
Ground Elevation AMSL (Ft/m)		4.00 /	1.22
Antenna Centerline AGL (Ft/m)		61.00 /	18.59
Transmit Antenna Type:		FCC32	FCC Reference
			32-25LOG(THETA)
6.0 GHz Gain (dBi) / Diameter (m)		35.0 /	1.2
3 dB / 15 dB Half Beamwidth		1.45 /	3.45
Operating Mode		TRANSMIT ONLY	
Modulation		DIGITAL	
Emission / Transmit Band (MHz)		614KG7D / 5925.0000 - 6425.0000	
Max. Available RF Power (dBW)/4 kHz)		-10.90	
(dBW)/MHz)		13.10	
Max. EIRP (dBW)/4 kHz)		24.10	
(dBW)/MHz)		46.00	
Max permissible Interference Power			
6.0 GHz, 20% (dBW/4 kHz)		-154.0	
6.0 GHz, 0.0025% (dBW/4 kHz)		-131.0	
Range of Satellite Arc (Geostationary)			
Degrees Longitude		186.0 W / 186.0 W	
Azimuth Range (Min/Max)		249.9 / 249.9	
Corresponding Elevation Angles		8.6 / 8.6	
Radio Climate		B	
Rain Zone		3	

Table 1 - Everett Earth Station Data Sheet

Table 2 - Everett ESV Route Break Points

Everett Washington Route Breakpoints
(ddmmss.s)

Point Name	latitude	longitude
Everett Pier	475918.3	1221310.5
Break PT 1	475739.3	1221934.5
Break PT 2	475237.3	1222213.5
Break PT 3	475247.3	1222839.5
Break PT 4	475527.3	1222936.5
Break PT 5	475753.3	1223444.5
Break PT 6	480151.3	1223809.6
Break PT 7	480646.3	1223936.6
Break PT 8	481120.3	1224731.6
Break PT 9	481220.3	1230636.6
Break PT 10	481357.3	1233157.7
Break PT 11	481857.3	1240157.8
Break PT 12	482909.2	1244345.9
Break Pt NE	482840.2	1260455
Break Pt SE	475753.2	1254934.9

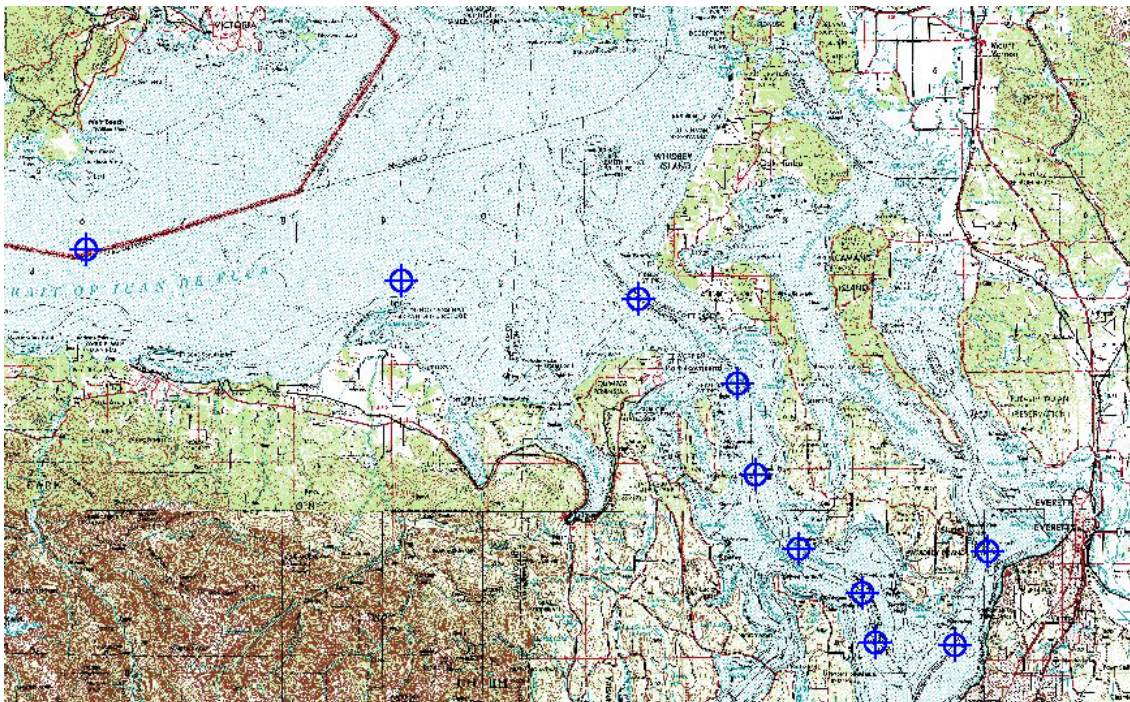


Figure 1 - Everett ESV Route

Section 3: The Critical Contour Point Technique

The Critical Contour Point (CCP) Technique has been developed to assist in the determination of interference from an ESV. The technique involves calculating the interference from all points along the route of the ESV and determining which point produces the worst case interference into a victim microwave receiver. The worst case interference level is then calculated for this point. If the calculated interference exceeds the maximum long-term permissible level of interference, which is shown in Table 1 above, then the licensed or coordinated receive frequencies for that site must be avoided in order to preclude interference.

The following section is excerpted from ITU-R SF 1649, which describes the CCP in more detail:

For any interference exposure of a particular FS receiver from an ESV terminal on a moving ship, there are three position-related variables in the calculation:

- propagation loss exceeded for all but a percentage of time. This loss depends on the length of the interference path, the Radio-Climatic Zones and may include the effects of any blockage that may exist on the interference path;
- FS receiver antenna gain; and
- ESV antenna horizon gain.

For every point within the operating contour as defined by the deep-draft channel (see Fig. 2), each of these three factors can be readily determined.

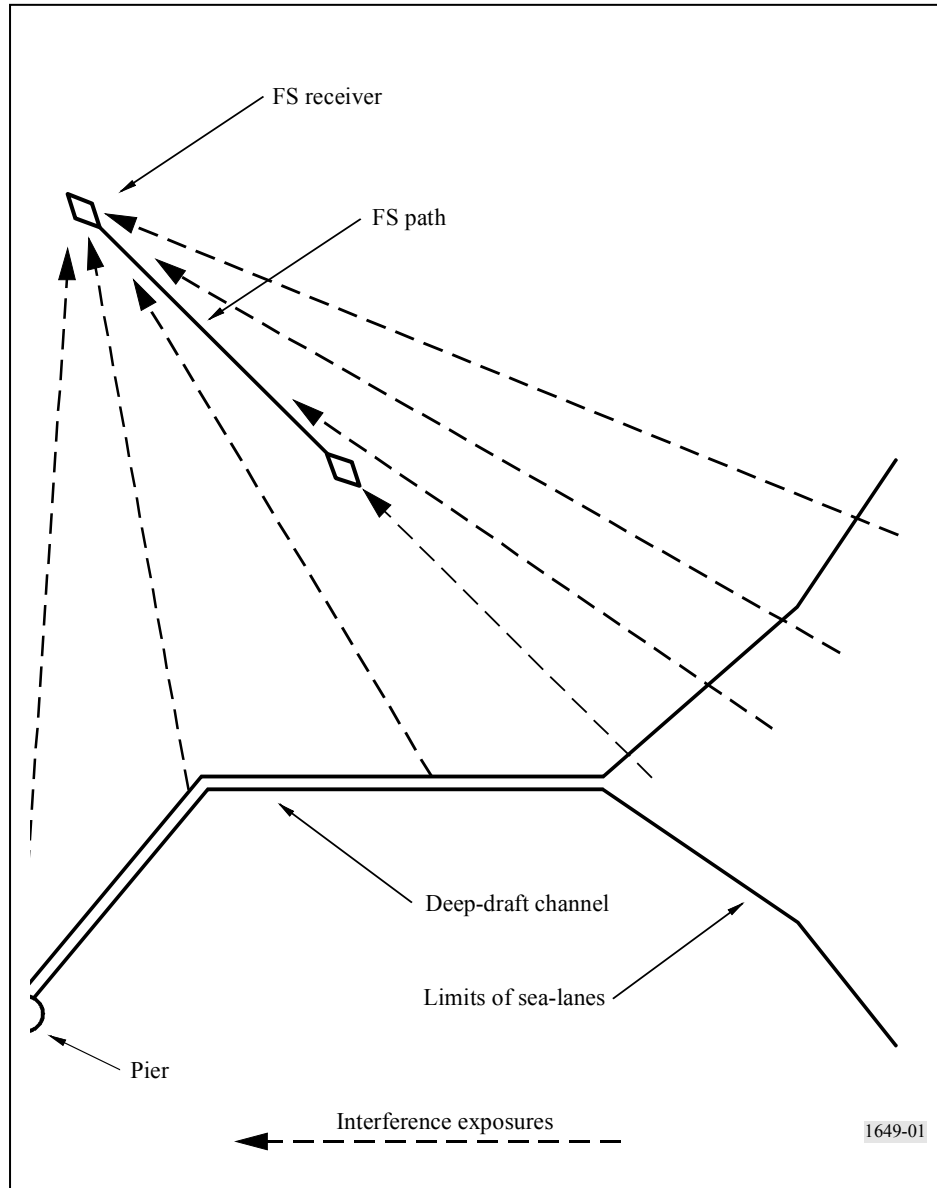


Figure 2 - Basic Interference Geometry

For the purpose of evaluating the potential interference the operating contour is approximated by a set of straight-line segments. The identification of the CCPs depends on the position and alignment of the FS path with respect to the operating contour, and several cases need to be distinguished. In those cases where the azimuth of the main beam axis of the FS antenna does not intersect with any portion of the operating area of the ESV, the critical contour points are the points along the operating contour where the contour changes direction or reaches the off-shore limit beyond which coordination is not required. In those cases where the azimuth of the main beam axis of the FS antenna intersects the operating contour it is necessary to augment and/or modify the number of CCPs. In any event, the same CCPs should be used to consider both the long-term and the short-term interference to any FS station under consideration. Interference from in-motion ESV operations to any FS receiver within the area where the potential interference from the ESV needs to be evaluated is assessed by consideration of the operation at each of the CCPs for each receiver using propagation loss models such as those given in Recommendation ITU-R P.452. The goal of this assessment is the identification of frequencies that can be used for in-motion ESV operations without causing unacceptable levels of interference to FS stations. For the identification of the CCPs with respect to a specific FS receiver, the following three cases need to be distinguished:

Case 1: In this case the main beam axis of the FS receiving antenna does not intersect any portion of the operating contour. The only CCPs required for this case are the points where the operating contour of the ESV changes direction.

Case 2: In this case, the main beam of the FS antenna (within 10 dB of the maximum antenna gain) lies entirely within one segment of the operating contour. The points on the operating contour where the antenna gain is 10 dB below the maximum, determine two additional CCPs. The segment of the operating contour between these two CCPs contains the natural intersection point (NIP), the point where the main beam axis of the FS antenna intersects the operating contour. The NIP is always taken as a CCP.

Case 3: In this case, the NIP is close enough to one of the points where the operating contour changes direction that the main beam of the FS antenna extends over more than one segment of the operating contour. This case is most likely to arise when the NIP is close to one of the points where the operating contour of the ESV changes direction. The intersection of the operating contour with the antenna 10 dB points determine two additional CCPs as in Case 2; however, in this case the original point within the main beam does not need to be considered as a CCP.

A further possibility: If there is a point on the operating contour of an ESV from which the maximum horizon gain of the ESV antenna is directed toward a FS receiver, that point on the contour may be identified as an additional CCP for that FS receiver regardless of which of the three cases applies.

Section 4 - Interference Results

Table 3 below summarizes the interference cases for the ESV route into the Everett, WA port.

Table 3 - Summary of ESV Route Interference Cases

Case #		Interference Margin (dB)	Dist (km)	Victim Receiver	state	Terrestrial Transmitter	state
	-						
378	1	54.9	21.7	WA1SEQUIM	WA	SEALAKEWOOD	WA
	-						
365	2	45.6	21.5	MAYNARD PK	WA	DEVILS MTN	WA
	-						
336	1	45.4	6.2	SEAEVERETT	WA	SEALAKEWOOD	WA
	-						
335	1	45.4	6.2	SEAEVERETT	WA	SEALAKEWOOD	WA
	-						
425	1	40.4	54.9	WA1PORTANGL	WA	WA1PORTTOWN	WA
	-						
426	1	39.4	54.9	WA1PORTANGL	WA	WA1PORTTOWN	WA
	-						
368	2	38.3	16.6	EDMONDS CC	WA	DEVILS MTN	WA
	-						
336	2	34.9	18.5	SEALAKEWOOD	WA	SEAEVERETT	WA
	-						
335	2	34.9	18.5	SEALAKEWOOD	WA	SEAEVERETT	WA
	-						
378	2	34.7	30.2	SEALAKEWOOD	WA	WA1SEQUIM	WA
	-						
327	2	34.7	15.9	MARYSVILLE	WA	COUGAR MTN	WA
	-						
465	2	33.3	117.6	MT ELLIS LO	WA	ANGELES PT	WA
	-						
376	2	33.0	30.7	TULALIP	WA	MAYNARD PK	WA
	-						
374	2	33.0	30.7	TULALIP	WA	MAYNARD PK	WA
	-					STRIPED	
472	1	32.0	114.6	ELLIS MT	WA	PEAK	WA
	-						
453	1	30.1	66.8	MT BUTCHART	BC	530 FORT ST	BC
	-						
482	2	29.9	51.3	ELLIS MTN	WA	BAHOKUS PK	WA
	-			PORT			
404	2	29.7	65.0	ANGELES	WA	MAYNARD PK	WA
	-			PORT			
403	2	29.7	65.0	ANGELES	WA	MAYNARD PK	WA
	-						
401	2	29.7	65.0	PORT ANGELE	WA	MAYNARD PK	WA
	-						
357	2	29.7	65.7	LOOKOUT MTN	WA	OAK HARBOR	WA
	-						
474	1	29.7	47.2	FORKS	WA	MT ELLIS LO	WA
	-						
365	1	29.5	40.9	DEVILS MTN	WA	MAYNARD PK	WA

348	1	29.0	49.0	MCMICKEN	WA	SEATTLE	WA
327	1	28.8	50.2	COUGAR MTN	WA	MARYSVILLE	WA
366	2	28.6	45.6	QUILCENE	WA	MAYNARD PK	WA
369	2	28.0	79.4	LOOKOUT MTN	WA	CLASSIC ROAD	WA
454	1	27.7	64.8	MAPLE MTN	BC	MT BUTCHART	BC
480	2	27.5	51.3	MT ELLIS LO	WA	BAHOKUS PK	WA
293	2	27.4	53.1	WEST TIGER	WA	NORWAY HILL	WA
340	1	27.3	73.8	GOLD MTN	WA	GARDINER	WA
479	1	27.3	47.2	FORKS	WA	MT ELLIS LO	WA
356	2	26.9	90.3	LOOKOUT MTN	WA	WHIDBEY ISL	WA
481	2	26.8	75.1	MT OCTOPUS	WA	MT ELLIS LO	WA
397	2	26.8	91.1	ACADEMY	WA	GOLD MTN	WA
468	1	25.5	151.8	ALOHA	WA	NEILTON	WA
355	2	25.4	95.7	MT CONSTITU	WA	WHIDBEY ISL	WA
346	2	25.3	49.6	COUGAR MTN	WA	ESO REDMOND	WA
323	1	25.1	97.4	SEATTLE-5	WA	BLYN	WA
458	1	25.0	121.2	RICHMOND COLUMBIA	BC	MAPLE MTN	BC
351	2	24.9	74.2	TWR	WA	APPLE COVE	WA
328	1	24.8	73.4	GOLD MTN	WA	MAYNARD PEAK	WA
457	2	24.5	121.2	RICHMOND CAPITOL	BC	MAPLE MTN	BC
350	1	24.1	76.9	HILL	WA	APPLE COVE	WA
352	2	24.1	70.6	QUEEN ANN	WA	APPLE COVE	WA
470	2	24.0	118.6	WA1PORTANGL	WA	WA1CLALLAM	WA
460	1	24.0	114.7	RICHMOND	BC	SALTSPRING	BC
477	1	24.0	74.9	OCTOPUS MTN	WA	ELLIS MT	WA
476	1	23.9	75.3	OCTOPUS MTN	WA	ELLIS MT	WA
464	2	23.7	197.6	BLACK TUSK	BC	WATTS POINT	BC
399	2	23.7	130.6	PT ROBERTS	WA	MT CONSTITU	WA
475	-	23.6	127.7	ALOHA	WA	OCTOPUS MTN	WA

	2						
	-						
375	2	23.5	77.9	FERNDALE	WA	LUMMI ISLAND	WA
	-						
478	2	23.3	90.6	QUEETS	WA	OCTOPUS MTN	WA
	-						
371	2	22.9	134.2	SUMAS CS	WA	ORCAS ISLE	WA
	-					BOWEN	
459	1	21.9	175.2	BRACKENDALE	BC	ISLAND	BC
	-						
337	1	21.7	144.7	TACOMA	WA	GOLD MTN	WA
	-						
354	2	21.6	6.5	RX7	WA	EVERETT	WA
	-			STRIPED			
472	2	21.2	143.7	PEAK	WA	ELLIS MT	WA
	-						
455	2	20.9	129.0	NANAIMO	BC	MAPLE MTN	BC
	-					SEATTLE	
283	1	20.7	146.1	GRASS MTN	WA	KTZZ	WA
	-						
456	2	20.7	129.0	NANAIMO	BC	MAPLE MTN	BC
	-						
465	1	20.4	149.8	ANGELES PT	WA	MT ELLIS LO	WA
	-						
377	2	20.3	124.8	BELKINGMTN	WA	WA1MTCONSTN	WA
	-						
446	1	20.2	171.9	HOLY CROSS	WA	COSMOPOLIS	WA
	-			RAVENS			
291	2	19.7	188.0	ROOST	WA	SQUAK MTN	WA
	-			RAVENS			
289	2	19.7	188.0	ROOST	WA	SQUAK MTN	WA
	-			CAPITOL			
452	2	19.6	137.9	PEAK	WA	ACADEMY	WA
	-						
471	2	19.3	118.6	WA1PORTANGL	WA	WA1CLALLAM	WA
	-			BOISTFORT			
388	2	18.4	165.4	PK	WA	BUSH MTN	WA
	-			BOISTFORT			
392	2	18.2	164.6	PK	WA	BUSH MTN	WA
	-					BOWEN	
462	2	18.2	159.4	WATTS POINT	BC	ISLAND	BC
	-			BOISTFORT			
398	2	17.9	164.6	PK	WA	BUSH MTN	WA
	-						
331	2	17.9	172.5	SQUAK MTN	WA	SEATTLE	WA
	-						
332	1	17.7	177.5	SQUAK MTN	WA	KING TV	WA
	-						
469	2	17.5	155.5	NEILTON	WA	QUEETS	WA
	-						
231	1	17.1	171.0	LAUREL MTN	WA	TIP TOP MTN	WA
	-						
451	2	17.0	160.3	COSMOPOLIS	WA	NEILTON	WA
	-						
330	1	17.0	152.8	GRAHAM HILL	WA	LESA	WA
	-						
473	1	16.7	178.0	WA4GRAYLAND	WA	WA4WESTPORT	WA

	-						
480	1	15.6	15.4	BAHOKUS PK	WA	MT ELLIS LO	WA
	-			BUCKHORN			
387	1	14.9	194.2	MTN	WA	CAPITOL PK	WA
	-						
470	1	13.5	16.3	WA1CLALLAM	WA	WA1PORTANGL	WA
	-						
367	2	13.0	6.3	PT TOWNSEND	WA	MAYNARD PK	WA
	-						
471	1	12.0	17.6	WA1CLALLAM	WA	WA1PORTANGL	WA
	-						
427	2	10.3	170.0	MT SEYMOUR	BC	VANCOUVER	BC
	-						
352	1	8.7	12.1	APPLE COVE	WA	QUEEN ANN	WA
	-					COLUMBIA	
351	1	8.1	12.1	APPLE COVE	WA	TWR	WA
	-					CAPITOL	
350	2	8.0	12.1	APPLE COVE	WA	HILL	WA
	-						
324	2	7.7	12.8	KINGSTON	WA	SQUAK MTN	WA
	-						
353	2	6.1	38.6	RX6	WA	BOEING FLD	WA
	-						
372	2	2.7	59.9	MT ERIE 2	WA	MARYSVILLE	WA
	-						
437	1	0.7	160.8	ABERDEEN PR	WA	ABERDEEN	WA

Section 5 - Summary of Results

The detailed interference calculation data is included in the attached Appendix A. It contains licensee and frequency information for each path. There are many potential interference cases for this ESV Route and Port. The clearable spectrum for this ESV Route and in Port is:

Clearable Spectrum

5925.0 - 5930.2 MHz

6419.8 - 6425.0 MHz

Due to a Time-Warner path using 5982 MHz as its center frequency, precluding the use of the middle of the band, the resulting clear spectrum is less than the so-called "4 percent solution." Approximately 10 MHz of spectrum is available.

APPENDIX A - ANALYSIS RESULT TABLES

Case #		Interference Level (dBW/4kHz)	Interference Margin (dB)	CCP Lat	CCP Lon	Dist (km)	Disc Angle (deg.)	Victim Receiver	St	Terrestrial Transmitter	St	Licensee	Emission Designator
378	-1	-99.1	54.9	48.07179	122.6481	21.7	0	WALSEQUIM	WA	SEALAKEWOOD	WA	Seattle SMSA Limited Partnership	30M0D7W
365	-2	-108.4	45.6	48.13656	122.7012	21.5	0	MAYNARD PK	WA	DEVILS MTN	WA	Time Warner Cable	30M0F8W
336	-1	-108.6	45.4	47.98139	122.2469	6.2	0	SEAEVERETT	WA	SEALAKEWOOD	WA	Seattle SMSA Limited Partnership	30M0D7W
335	-1	-108.6	45.4	47.98139	122.2469	6.2	0	SEAEVERETT	WA	SEALAKEWOOD	WA	Seattle SMSA Limited Partnership	30M0D7W
425	-1	-113.6	40.4	48.07372	122.6487	54.9	0	WALPORTANGL	WA	WALPORTTOWN	WA	Seattle SMSA Limited Partnership	10M0D7W
426	-1	-114.6	39.4	48.07372	122.6487	54.9	0	WALPORTANGL	WA	WALPORTTOWN	WA	Seattle SMSA Limited Partnership	30M0D7W
368	-2	-115.7	38.3	47.96468	122.3117	16.6	0	EDMONDS CC	WA	DEVILS MTN	WA	Time Warner Cable	30M0F8W
336	-2	-119.1	34.9	47.98139	122.2469	18.5	0	SEALAKEWOOD	WA	SEAEVERETT	WA	Seattle SMSA Limited Partnership	30M0D7W
335	-2	-119.1	34.9	47.98139	122.2469	18.5	0	SEALAKEWOOD	WA	SEAEVERETT	WA	Seattle SMSA Limited Partnership	30M0D7W
378	-2	-119.3	34.7	48.07179	122.6481	30.2	0	SEALAKEWOOD	WA	WALSEQUIM	WA	Seattle SMSA Limited Partnership	30M0D7W
327	-2	-119.3	34.7	47.98842	122.2196	15.9	1.00698	MARYSVILLE	WA	COUGAR MTN	WA	Puget Sound Energy	10M0D7W
465	-2	-120.7	33.3	48.1514	122.7269	117.6	0	MT ELLIS LO	WA	ANGELES PT	WA	CENTURYTEL OF WASHINGTON, INC.	30M0D7W
376	-2	-121.0	33.0	48.06067	122.6448	30.7	0	TULALIP	WA	MAYNARD PK	WA	Time Warner Cable	30M0F8W
374	-2	-121.0	33.0	48.06067	122.6448	30.7	0	TULALIP	WA	MAYNARD PK	WA	Time Warner Cable	30M0F8W
472	-1	-122.0	32.0	48.1746	122.7672	114.6	0	ELLIS MT	WA	STRIPED PEAK	WA	Washington State Patrol	30M0D7W
453	-1	-123.9	30.1	48.19429	122.8916	66.8	0	MT BUTCHART	BC	530 FORT ST	BC	AT&T CANADA CORP	30M0D7W
482	-2	-124.1	29.9	48.45507	124.796	51.3	0	ELLIS MTN	WA	BAHOKUS PK	WA	Tribune Television Northwest, Inc.	30M0F8W
404	-2	-124.3	29.7	47.95429	122.5568	65.0	0	PORT ANGELES	WA	MAYNARD PK	WA	Time Warner Cable	30M0F8W
403	-2	-124.3	29.7	47.95429	122.5568	65.0	0	PORT ANGELES	WA	MAYNARD PK	WA	Time Warner Cable	30M0F8W
401	-2	-124.3	29.7	47.95429	122.5568	65.0	0	PORT ANGELES	WA	MAYNARD PK	WA	Time Warner Cable	30M0F8W
357	-2	-124.3	29.7	48.16519	122.7508	65.7	0	LOOKOUT MTN	WA	OAK HARBOR	WA	Sprint Communications Co., LP	30M0F7W
474	-1	-124.3	29.7	48.35852	124.2055	47.2	0	FORKS	WA	MT ELLIS LO	WA	CENTURYTEL OF WASHINGTON, INC.	30M0D7W
365	-1	-124.5	29.5	48.13656	122.7012	40.9	0	DEVILS MTN	WA	MAYNARD PK	WA	Time Warner Cable	30M0F8W
348	-1	-125.0	29.0	47.87937	122.461	49.0	0	MCMICKEN	WA	SEATTLE	WA	Union Pacific Railroad Company	4M94D7W
327	-1	-125.2	28.8	47.98842	122.2196	50.2	359.68	COUGAR MTN	WA	MARYSVILLE	WA	Puget Sound Energy	10M0D7W
366	-2	-125.4	28.6	48.20055	123.011	45.6	0	QUILCENE	WA	MAYNARD PK	WA	Time Warner Cable	30M0F8W
369	-2	-126.0	28.0	47.99315	122.6035	79.4	0	LOOKOUT MTN	WA	CLASSIC ROAD	WA	WHIDBEY TELEPHONE COMPANY	30M0D9W
454	-1	-126.3	27.7	48.25082	123.641	64.8	0	MAPLE MTN	BC	MT BUTCHART	BC	AT&T CANADA CORP	30M0D7W
480	-2	-126.5	27.5	48.45298	124.8005	51.3	0	MT ELLIS LO	WA	BAHOKUS PK	WA	CENTURYTEL OF WASHINGTON, INC.	30M0D7W
293	-2	-126.6	27.4	47.9063	122.355	53.1	0	WEST TIGER	WA	NORWAY HILL	WA	EASTSIDE PUBLIC SAFETY COM AGENCY	30M0D7W
340	-1	-126.7	27.3	48.19904	122.982	73.8	0	GOLD MTN	WA	GARDINER	WA	Washington State Patrol	30M0D7W
479	-1	-126.7	27.3	48.35852	124.2055	47.2	0	FORKS	WA	MT ELLIS LO	WA	CENTURYTEL OF WASHINGTON, INC.	30M0F7W
356	-2	-127.1	26.9	47.87952	122.4666	90.3	0	LOOKOUT MTN	WA	WHIDBEY ISL	WA	WHIDBEY TELEPHONE COMPANY	30M0D9W
481	-2	-127.2	26.8	48.40688	124.403	75.1	0	MT OCTOPUS	WA	MT ELLIS LO	WA	CENTURYTEL OF WASHINGTON, INC.	30M0D7W

397	-2	-127.2	26.8	47.87713	122.3747	91.1	0	ACADEMY	WA	GOLD MTN	WA	Washington State Patrol	30M0D7W
468	-1	-128.5	25.5	48.11954	122.6717	151.8	0	ALOHA	WA	NEILTON	WA	Washington State Patrol	30M0D7W
355	-2	-128.6	25.4	47.87716	122.3755	95.7	0	MT CONSTITU	WA	WHIDBEY ISL	WA	WHIDBEY TELEPHONE COMPANY	30M0D9W
346	-2	-128.7	25.3	47.97642	122.2662	49.6	0	COUGAR MTN	WA	ESO REDMOND	WA	Puget Sound Energy	30M0D7W
323	-1	-128.9	25.1	48.21982	123.3293	97.4	0	SEATTLE-5	WA	BLYN	WA	QWEST CORPORATION	30M0F7W
458	-1	-129.0	25.0	48.36131	124.2168	121.2	0	RICHMOND	BC	MAPLE MTN	BC	AT&T CANADA CORP	30M0D7W
351	-2	-129.1	24.9	48.18982	122.8077	74.2	0	COLUMBIA TWR	WA	APPLE COVE	WA	SEATTLE CITY WASHINGTON	30M0D7W
328	-1	-129.2	24.8	48.1986	122.9737	73.4	0	GOLD MTN	WA	MAYNARD PEAK	WA	Tribune Television Northwest, Inc.	30M0F8W
457	-2	-129.5	24.5	48.36131	124.2168	121.2	0	RICHMOND	BC	MAPLE MTN	BC	ROGERS WIRELESS INC	30M0D7W
350	-1	-129.9	24.1	48.19336	122.874	76.9	0	CAPITOL HILL	WA	APPLE COVE	WA	SEATTLE CITY WASHINGTON	30M0D7W
352	-2	-129.9	24.1	48.18961	122.8038	70.6	0	QUEEN ANN	WA	APPLE COVE	WA	SEATTLE CITY WASHINGTON	30M0D7W
470	-2	-130.0	24.0	48.41525	124.8812	118.6	0	WAIPORTANGL	WA	WAICLALLAM	WA	Seattle SMSA Limited Partnership	4M94D7W
460	-1	-130.0	24.0	48.31519	124.0284	114.7	0	RICHMOND	BC	SALTSPRING	BC	TELE-MOBILE COMPANY	30M0D7W
477	-1	-130.0	24.0	48.40612	124.3998	74.9	0	OCTOPUS MTN	WA	ELLIS MT	WA	Washington State Patrol	30M0D7W
476	-1	-130.1	23.9	48.40772	124.4064	75.3	0	OCTOPUS MTN	WA	ELLIS MT	WA	Washington State Patrol	30M0D7W
464	-2	-130.3	23.7	48.28202	123.8276	197.6	0	BLACK TUSK	BC	WATTS POINT	BC	TELUS COMMUNICATIONS, (B.C.) INC.	29M0D7W
399	-2	-130.3	23.7	47.91518	122.3504	130.6	0	PT ROBERTS	WA	MT CONSTITU	WA	WHIDBEY TELEPHONE COMPANY	30M0F7W
475	-2	-130.4	23.6	48.34979	124.17	127.7	0	ALOHA	WA	OCTOPUS MTN	WA	Washington State Patrol	30M0D7W
375	-2	-130.5	23.5	48.19785	122.9592	77.9	0	FERNDAL	WA	LUMMI ISLAND	WA	Sprint PCS	3M75D7W
478	-2	-130.7	23.3	48.27076	123.7601	90.6	0	QUEETS	WA	OCTOPUS MTN	WA	Washington State Patrol	30M0D7W
371	-2	-131.1	22.9	48.25171	123.6463	134.2	0	SUMAS CS	WA	ORCAS ISLE	WA	Northwest Pipeline Corporation	2M50D7W
459	-1	-132.1	21.9	48.32216	124.0581	175.2	0	BRACKENDALE	BC	BOWEN ISLAND	BC	ROGERS WIRELESS INC	5M00D7W
337	-1	-132.3	21.7	48.22947	123.4826	144.7	0	TACOMA	WA	GOLD MTN	WA	Washington State Patrol	30M0D7W
354	-2	-132.4	21.6	47.91958	122.348	6.5	307.095	RX7	WA	EVERETT	WA	The Boeing Company	50M0F9W
472	-2	-132.8	21.2	48.07616	125.5958	143.7	0	STRIPED PEAK	WA	ELLIS MT	WA	Washington State Patrol	30M0D7W
455	-2	-133.1	20.9	48.19858	122.9733	129.0	0	NANAIMO	BC	MAPLE MTN	BC	AT&T CANADA CORP	29M0D7W
283	-1	-133.3	20.7	48.20306	123.0597	146.1	0	GRASS MTN	WA	SEATTLE KTZZ	WA	NORTHWEST MICROWAVE INC	30M0D9W
456	-2	-133.3	20.7	48.19858	122.9733	129.0	0	NANAIMO	BC	MAPLE MTN	BC	AT&T CANADA CORP	29M6D7W
465	-1	-133.6	20.4	48.09791	125.5505	149.8	0	ANGELES PT	WA	MT ELLIS LO	WA	QWEST CORPORATION	30M0D7W
377	-2	-133.7	20.3	48.30728	123.9803	124.8	0	BELKINGMTN	WA	WAI MTCONSTN	WA	Verizon Wireless (VZW) LLC - Seattle/Tac	10M0D7W
446	-1	-133.8	20.2	48.23113	123.5092	171.9	0	HOLY CROSS	WA	COSMOPOLIS	WA	PUBLIC UTILITY DIST #2 OF PACIFIC COUNTY	30M0D7W
291	-2	-134.3	19.7	48.20679	123.1276	188.0	0	RAVENS ROOST	WA	SQUAK MTN	WA	Time Warner Cable	30M0F8W
289	-2	-134.3	19.7	48.20679	123.1276	188.0	0	RAVENS ROOST	WA	SQUAK MTN	WA	Time Warner Cable	30M0F8W
452	-2	-134.4	19.6	48.21257	123.2165	137.9	0	CAPITOL PEAK	WA	ACADEMY	WA	Washington State Patrol	30M0D7W
471	-2	-134.7	19.3	48.41535	124.881	118.6	0	WAIPORTANGL	WA	WAICLALLAM	WA	Seattle SMSA Limited Partnership	10M0D7W
388	-2	-135.6	18.4	47.89122	122.4817	165.4	0	BOISTFORT PK	WA	BUSH MTN	WA	Time Warner Cable	30M0F8W
392	-2	-135.8	18.2	47.8797	122.4737	164.6	0	BOISTFORT PK	WA	BUSH MTN	WA	Time Warner Cable	30M0F8W
462	-2	-135.8	18.2	48.30806	123.985	159.4	0	WATTS POINT	BC	BOWEN ISLAND	BC	NAVIGATA COMMUNICATIONS INC	29M6D7W
398	-2	-136.1	17.9	47.8797	122.4737	164.6	0	BOISTFORT PK	WA	BUSH MTN	WA	Time Warner Cable	30M0F8W

331	-2	-136.1	17.9	48.31322	124.0164	172.5	0	SQUAK MTN	WA	SEATTLE	WA	Time Warner Cable	30M0F8W
332	-1	-136.3	17.7	48.32783	124.081	177.5	0	SQUAK MTN	WA	KING TV	WA	Time Warner Cable	25M0F8W
469	-2	-136.5	17.5	48.01719	125.7182	155.5	0	NEILTON	WA	QUEETS	WA	Washington State Patrol	30M0D7W
231	-1	-136.9	17.1	47.96672	122.3038	171.0	0	LAUREL MTN	WA	TIP TOP MTN	WA	RCC Minnesota Inc	2M50D7W
451	-2	-137.0	17.0	48.34629	124.1558	160.3	0	COSMOPOLIS	WA	NEILTON	WA	Washington State Patrol	30M0D7W
330	-1	-137.0	17.0	48.21912	123.3184	152.8	0	GRAHAM HILL	WA	LESA	WA	TACOMA CITY DEPT OF PUBLIC UTILITIES	30M0D7W
473	-1	-137.3	16.7	48.39937	124.3722	178.0	0	WA4GRAYLAND	WA	WA4WESTPORT	WA	Verizon Wireless (VZW) LLC - Seattle/Tac	2M50D7W
480	-1	-138.4	15.6	48.42626	124.4826	15.4	291.986	BAHOKUS PK	WA	MT ELLIS LO	WA	CENTURYTEL OF WASHINGTON, INC.	30M0D7W
387	-1	-139.1	14.9	48.23651	123.556	194.2	0	BUCKHORN MTN	WA	CAPITOL PK	WA	WASHINGTON STATE DOT	30M0D7W
470	-1	-140.5	13.5	48.31789	124.0408	16.3	316.585	WA1CLALLAM	WA	WA1PORTANGL	WA	Seattle SMSA Limited Partnership	4M94D7W
367	-2	-141.0	13.0	48.14592	122.7174	6.3	209.618	PT TOWNSEND	WA	MAYNARD PK	WA	Time Warner Cable	30M0F8W
471	-1	-142.0	12.0	48.31377	124.0197	17.6	319.992	WA1CLALLAM	WA	WA1PORTANGL	WA	Seattle SMSA Limited Partnership	10M0D7W
427	-2	-143.7	10.3	48.48586	124.8704	170.0	0	MT SEYMOUR	BC	VANCOUVER	BC	AT&T CANADA CORP	30M0D7W
352	-1	-145.3	8.7	47.87702	122.3704	12.1	258.329	APPLE COVE	WA	QUEEN ANN	WA	SEATTLE CITY WASHINGTON	30M0D7W
351	-1	-145.9	8.1	47.87702	122.3704	12.1	258.61	APPLE COVE	WA	COLUMBIA TWR	WA	SEATTLE CITY WASHINGTON	30M0D7W
350	-2	-146.0	8.0	47.87702	122.3704	12.1	263.211	APPLE COVE	WA	CAPITOL HILL	WA	SEATTLE CITY WASHINGTON	30M0D7W
324	-2	-146.3	7.7	47.87702	122.3704	12.8	274.859	KINGSTON	WA	SQUAK MTN	WA	Time Warner Cable	30M0F8W
353	-2	-147.9	6.1	47.87702	122.3704	38.6	49.4468	RX6	WA	BOEING FLD	WA	The Boeing Company	50M0F9W
372	-2	-151.3	2.7	47.98842	122.2196	59.9	7.52836	MT ERIE 2	WA	MARYSVILLE	WA	Puget Sound Energy	10M0D7W
437	-1	-153.3	0.7	48.36594	124.2356	160.8	0	ABERDEEN PR	WA	ABERDEEN	WA	QWEST CORPORATION	30M0D7W
345	-1	-154.7	-0.7	47.98842	122.2196	81.2	353.884	FIFE	WA	MCMICKEN	WA	Union Pacific Railroad Company	4M94D7W
482	-1	-154.8	-0.8	48.41353	124.4303	18.0	298.785	BAHOKUS PK	WA	ELLIS MTN	WA	Tribune Television Northwest, Inc.	30M0F8W

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397	-2	6286.19	H		0	0		0	0		0	0		0	0		0	0
468	-1	6004.5	V		0	0		0	0		0	0		0	0		0	0
355	-2	6197.24	V	6315.84	V		0	0		0	0		0	0		0	0	0
346	-2	6093.45	H		0	0		0	0		0	0		0	0		0	0
323	-1	6286.19	V	6315.84	H	6345.49	V	6375.14	H	6404.79	V		0	0		0	0	0
458	-1	5945.2	G	5974.85	V	6004.5	G	6034.15	V	6063.8	G	6093.45	U	6123.1	G	6152.75	V	
351	-2	6063.8	H		0	0		0	0		0	0		0	0		0	0
328	-1	6404.79	H		0	0		0	0		0	0		0	0		0	0
457	-2	5974.85	V	6034.15	V		0	0		0	0		0	0		0	0	0
350	-1	5945.2	V		0	0		0	0		0	0		0	0		0	0
352	-2	6063.8	H		0	0		0	0		0	0		0	0		0	0
470	-2	6402.32	V		0	0		0	0		0	0		0	0		0	0
460	-1	6315.84	H		0	0		0	0		0	0		0	0		0	0
477	-1	6404.79	H		0	0		0	0		0	0		0	0		0	0
476	-1	6404.79	H		0	0		0	0		0	0		0	0		0	0
464	-2	6034.15	H	6093.45	H		0	0		0	0		0	0		0	0	0
399	-2	5945.2	V	6093.45	H		0	0		0	0		0	0		0	0	0
475	-2	5945.2	V		0	0		0	0		0	0		0	0		0	0
375	-2	6165.722	V		0	0		0	0		0	0		0	0		0	0
478	-2	6004.5	V		0	0		0	0		0	0		0	0		0	0
371	-2	6139.16	H		0	0		0	0		0	0		0	0		0	0
459	-1	5912.375	H		0	0		0	0		0	0		0	0		0	0
337	-1	6226.89	V		0	0		0	0		0	0		0	0		0	0
354	-2	5950	V		0	0		0	0		0	0		0	0		0	0
472	-2	6256.54	H		0	0		0	0		0	0		0	0		0	0
455	-2	5974.85	H		0	0		0	0		0	0		0	0		0	0
283	-1	6197.24	V	6226.89	H	6256.54	V	6286.19	H	6315.84	V	6345.49	H	6375.14	V	6404.79	H	
456	-2	6034.15	H		0	0		0	0		0	0		0	0		0	0
465	-1	6197.24	U	6315.84	U	6375.14	V		0	0		0	0		0	0		0
377	-2	6004.5	V		0	0		0	0		0	0		0	0		0	0
446	-1	6226.89	H		0	0		0	0		0	0		0	0		0	0
291	-2	6197.24	V		0	0		0	0		0	0		0	0		0	0
289	-2	6226.89	H	6256.54	V	6286.19	H	6315.84	V	6345.49	H	6375.14	V	6404.79	H		0	0
452	-2	6093.45	H		0	0		0	0		0	0		0	0		0	0
471	-2	6286.19	V		0	0		0	0		0	0		0	0		0	0
388	-2	6345.49	V		0	0		0	0		0	0		0	0		0	0
392	-2	6197.24	H	6226.89	U	6256.54	H	6286.19	U	6315.84	H	6345.49	U	6375.14	H	6404.79	U	
462	-2	6226.89	V	6256.54	V	6286.19	V	6315.84	H	6345.49	V	6375.14	H	6404.79	V		0	0
398	-2	6197.24	H	6256.54	H	6315.84	H	6345.49	V		0	0		0	0		0	0

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