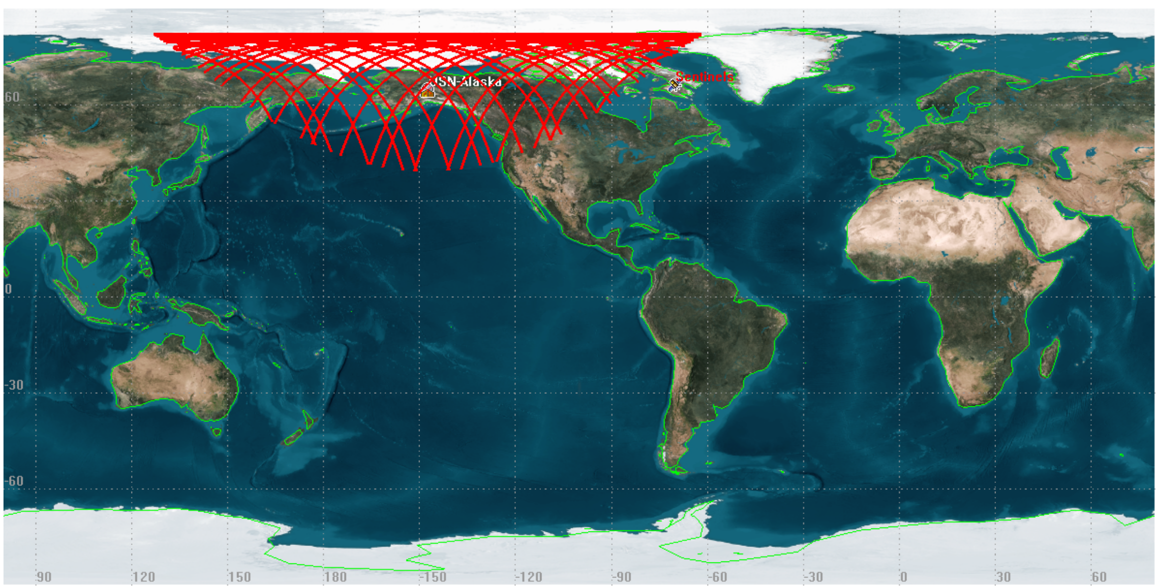
USN LEOP support for Sentinels-1A from Alaska

Sentinels-1A is the first in a series of Synthetic Aperture Radar (SAR) earth observation science satellites launched by ESA to serve the European Union. Sentinels-1A will be launched from the CNES space center in Kourou French Guiana on March 28th, 2014 at a nominal liftoff time of 21:02:26 UTC. The Sentinels-1A spacecraft will be supported by the USN Alaska ground station using a downlink frequency = 2254.099 MHz and uplink = 2075.650 MHz, and has been fully coordinated by Comsearch.

The LEOP support is scheduled to be conducted for 3 days with contingency to extend an additional 4 days for a total of up to 7 days at the USN tracking station in Alaska. The exact pass schedule is still TBD, but for planning purposes it should be assumed that all the passes visible from Alaska will be supported for the first 3 days of the LEOP.

SENTINELS-1A
1 90001U 00000A   14087.89294236 .00000000 00000+0 00000+0 0 00015
2 90001 98.1823 96.2132 0001360 75.3062 352.1134 14.59181058   00



USN Alaska coverage of Sentinels LEOP from 28 March thru 31 March 2014

USN Alaska possible passes for Sentinels-1A 28 Mar 2014 thru 31 Mar 2014 UTC

Pass	Start Time (UTCG)	Stop Time (UTCG)	Duration (sec)
1	28 Mar 2014 21:27:17	28 Mar 2014 21:37:48	630.8
2	28 Mar 2014 23:02:54	28 Mar 2014 23:14:01	667.2
3	29 Mar 2014 00:38:23	29 Mar 2014 00:51:12	768.8
4	29 Mar 2014 02:14:54	29 Mar 2014 02:28:52	837.5
5	29 Mar 2014 03:53:15	29 Mar 2014 04:06:39	804.1
6	29 Mar 2014 05:34:09	29 Mar 2014 05:44:08	598.9
7	29 Mar 2014 14:00:58	29 Mar 2014 14:11:16	618.3
8	29 Mar 2014 15:38:29	29 Mar 2014 15:52:00	810.1
9	29 Mar 2014 17:16:17	29 Mar 2014 17:30:13	835.9
10	29 Mar 2014 18:53:56	29 Mar 2014 19:06:39	763.0
11	29 Mar 2014 20:31:04	29 Mar 2014 20:42:06	662.4
12	29 Mar 2014 22:07:14	29 Mar 2014 22:17:46	632.3
13	29 Mar 2014 23:42:39	29 Mar 2014 23:54:26	707.6
14	30 Mar 2014 01:18:26	30 Mar 2014 01:31:52	806.1
15	30 Mar 2014 02:55:39	30 Mar 2014 03:09:38	839.2
16	30 Mar 2014 04:34:56	30 Mar 2014 04:47:22	745.5
17	30 Mar 2014 06:17:23	30 Mar 2014 06:24:21	417.8
18	30 Mar 2014 13:04:48	30 Mar 2014 13:10:39	350.6
19	30 Mar 2014 14:41:33	30 Mar 2014 14:53:38	725.1
20	30 Mar 2014 16:19:15	30 Mar 2014 16:33:12	836.5
21	30 Mar 2014 17:57:01	30 Mar 2014 18:10:35	814.2
22	30 Mar 2014 19:34:31	30 Mar 2014 19:46:30	719.1
23	30 Mar 2014 21:11:17	30 Mar 2014 21:21:53	636.2
24	30 Mar 2014 22:47:02	30 Mar 2014 22:57:56	654.0
25	31 Mar 2014 00:22:27	31 Mar 2014 00:34:59	751.8
26	31 Mar 2014 01:58:45	31 Mar 2014 02:12:36	831.6
27	31 Mar 2014 03:36:44	31 Mar 2014 03:50:24	819.2
28	31 Mar 2014 05:17:09	31 Mar 2014 05:27:59	650.2
29	31 Mar 2014 13:44:50	31 Mar 2014 13:54:11	560.8
30	31 Mar 2014 15:22:14	31 Mar 2014 15:35:26	792.2
31	31 Mar 2014 17:00:01	31 Mar 2014 17:14:01	840.0
32	31 Mar 2014 18:37:43	31 Mar 2014 18:50:42	779.4
33	31 Mar 2014 20:14:58	31 Mar 2014 20:26:15	677.0
34	31 Mar 2014 21:51:19	31 Mar 2014 22:01:48	629.2
35	31 Mar 2014 23:26:47	31 Mar 2014 23:38:18	690.6

Flux Density impinging on the ground in Alaska from Sentinels-1A
The Flux density is calculated as:

$$Flux\ density = EIRP\ \div (4\,\pi\, Rse^2)$$

Where Rse is the distance from spacecraft to the ground.
Where $EIRP$ is the Effective Isotropic Radiated Power of the Spacecraft.

Data from the spacecraft vendor indicates that the maximum EIRP of Sentinels-1A is -8.83 dBW. The altitude (and thus the closest distance to earth during an overhead pass) is = 692 Km.

Converting -8.83 dBW to scalar watts = 0.130 watts transmitted at 2254.099 MHz

Therefor:

$$Flux\ density = 0.13\ \div (4\,\pi\, *\ 692{,}000\ meters^2)$$

Flux density = 2.160 x 10^{-14} Watts/meter^2
Or
Flux density = 2.160 x 10^{-15} mW/cm^2