Satellite Communications

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CSE, Intelsat
Satellite Example IS904

• General Satellite Information
  • Spacecraft Type: Three-Axis Stabilized
  • Orbital Location: 60.0° East Longitude
  • Orbital Control: +/- 0.05°
  • Launch: 23 February 2002
IS904 Coverage maps

Ku-band Spot 1 Beam Peak up to 54.0 dBW

Ku-band Spot 2 Beam Peak up to 53.8 dBW
General Satellite Information cont

• **Payload:**
  - Up to 34 x 72 MHz C-Band transponders *
  - Up to 11 x 36 MHz C-Band transponders *
  - 2 x 41 MHz C-Band transponders
  - Up to 2 x 77 MHz Ku-Band transponders
  - Up to 6 x 72 MHz Ku-Band transponders
  - Up to 8 x 36 MHz Ku-Band transponders

• **Frequency Bands:**
  - **C-Band:**
    - Uplink  5850 – 6425 MHz
    - Downlink  3625 – 4200 MHz
  - **Ku-Band:**
    - Uplink  14.00 – 14.50 GHz
    - Downlink  10.95 – 11.20 GHz (Band A) and
    - Downlink  11.45 – 11.70 GHz (Band B)

• **Beacons:**
  - 3947.5 or 3948 MHz  3952 or 3952.5 MHz
  - 11198 MHz  11452 MHz
Intelsat 904  C-Band Payload

- Number of Transponders:
  - Up to 34 x 72 MHz *
  - Up to 11 x 36 MHz *
  - 2 x 41 MHz

- Transponder Bandwidth:
  - 72 MHz with 8 MHz Guard Bands
  - 36 MHz with 4 MHz Guard Bands
  - 41 MHz with 4 MHz Guard Bands

- Polarization: Circular: LHCP and RHCP
- SFD (at Beam Reference Contour): -67.0 to -89.0 dBW/m²
- Input Attenuators: 22 dB in 2 dB steps
**Intelsat 904  C-Band Payload cont**

- **G/T:**
  - > -11.2 dB/K typical for GA, GB
  - > -7.4 dB/K typical for WH
  - > -5.1 dB/K typical for EH
  - > 0.0 dB/K typical for NWZ
  - > -1.5 dB/K typical for NEZ, SEZ
  - > -3.5 dB/K typical for MEZ
  - > -5.0 dB/K typical for SWZ
  - > -4.5 dB/K typical for CEZ (combined NEZ/SEZ)

- **EIRP:**
  - > 31.0 dBW typical for GA, GB
  - > 40.1 dBW typical for Ch. 1'-2', 5-6, 7-8 and 9 SEZ
  - > 37.0 dBW typical for WH, NWZ, NEZ, SWZ, MEZ, SEZ
  - > 37.5 dBW typical for EH
  - > 35.1 dBW typical for CEZ (combined NEZ/SEZ)
Eastern Hemi Beam
Pointing angles

Antenna Alignment
Produced using Satmaster+
Friday 14 November 2014

Site name
Satellite name

Input Parameters
Site latitude
Site longitude
Satellite longitude
Inclination
Spot beam polarization angle
Antenna offset focus angle

Satellite Look Angles
Elevation
True azimuth
Azimuth compass bearing
Polarization offset
Path distance to satellite

Modified Polar Mount Settings
Polar axis
Polar elevation
Declination offset
Apex declination
Apex elevation

Satellite name
Lubumbashi, Dem. Rep of Congo
Intelsat 904

Input Parameters
Site latitude
Site longitude
Satellite longitude
Inclination
Spot beam polarization angle
Antenna offset focus angle

Satellite Look Angles
Elevation
True azimuth
Azimuth compass bearing
Polarization offset
Path distance to satellite

Modified Polar Mount Settings
Polar axis
Polar elevation
Declination offset
Apex declination
Apex elevation
Pointing angles

White lines on the outside represent the elevation look angle.
Price

Satellite bw prices is based on a few factors:
- How much bw are you taking
- How long is the duration of the contract
- What type of capacity
  - C band
  - Ku band
  - Hemi beam
  - Global beam
  - Zone
  - Spot Beam
Replacement satellite

Replacement satellite for IS904 at 60° is IS33e

Launch date for the satellite is 3rd quarter of 2016
In Service date of 4th quarter of 2016

Existing service on IS904 will transition directly into the new satellite

The transition is referred to as a PIN transition
The new Satellite is co-located at the same orbital location
Transponder on IS33e is switch ON and then on IS904 the corresponding XP is switched OFF
IS-33e C-band Mission: 6 spots and a hot zone beam

Spot Beam Edge Performance:

<table>
<thead>
<tr>
<th>Coverage Polygon</th>
<th>Saturated EIRP in dBW</th>
<th>G/T in dB/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-Spot 2</td>
<td>46.3</td>
<td>+2.6</td>
</tr>
<tr>
<td>C-Spot 3</td>
<td>46.2</td>
<td>+3.2</td>
</tr>
<tr>
<td>C-Spot 4</td>
<td>47.4</td>
<td>+4.2</td>
</tr>
<tr>
<td>C-Spot 5</td>
<td>47.4</td>
<td>+3.0</td>
</tr>
<tr>
<td>C-Spot 6</td>
<td>47.0</td>
<td>+2.9</td>
</tr>
<tr>
<td>C-Spot 7</td>
<td>46.3</td>
<td>+3.4</td>
</tr>
</tbody>
</table>

Zone Edge Performance:

<table>
<thead>
<tr>
<th>Coverage Polygon</th>
<th>Saturated EIRP in dBW</th>
<th>G/T in dB/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer</td>
<td>41.3</td>
<td>-1.3</td>
</tr>
</tbody>
</table>

Global Edge Performance:

<table>
<thead>
<tr>
<th>Coverage Polygon</th>
<th>Saturated EIRP in dBW</th>
<th>G/T in dB/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>33.3</td>
<td>-10.3</td>
</tr>
</tbody>
</table>
### Ku-Band Mission: 63 spots and a wide beam

#### Spot Beam Performance (Indicative):
<table>
<thead>
<tr>
<th>EOC</th>
<th>G/T (dB/K)</th>
<th>EIRP (dBW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>54.5 – 55.3</td>
<td>7.0 – 8.7</td>
<td></td>
</tr>
<tr>
<td>Peak</td>
<td>58.8 – 62.8</td>
<td>12.4 – 16.5</td>
</tr>
</tbody>
</table>

#### Wide-beam Performance:
<table>
<thead>
<tr>
<th></th>
<th>EIRP (dBW)</th>
<th>G/T (dB/K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner</td>
<td>44.4</td>
<td>-2.1</td>
</tr>
<tr>
<td>Outer</td>
<td>41.8</td>
<td>-4.6</td>
</tr>
</tbody>
</table>
Sub-Saharan Africa User Spot Beams

<table>
<thead>
<tr>
<th>Sub-Saharan Africa</th>
<th>Uplink</th>
<th>Downlink</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>22 Spots</td>
<td>17 Spots</td>
</tr>
<tr>
<td></td>
<td>2 GW</td>
<td>5 Spots</td>
</tr>
<tr>
<td></td>
<td>2 GW</td>
<td>GW</td>
</tr>
<tr>
<td></td>
<td>2 GW</td>
<td>GW</td>
</tr>
<tr>
<td>Total (Mhz)</td>
<td>3,020</td>
<td>3,204</td>
</tr>
</tbody>
</table>
• Thank you

• Questions