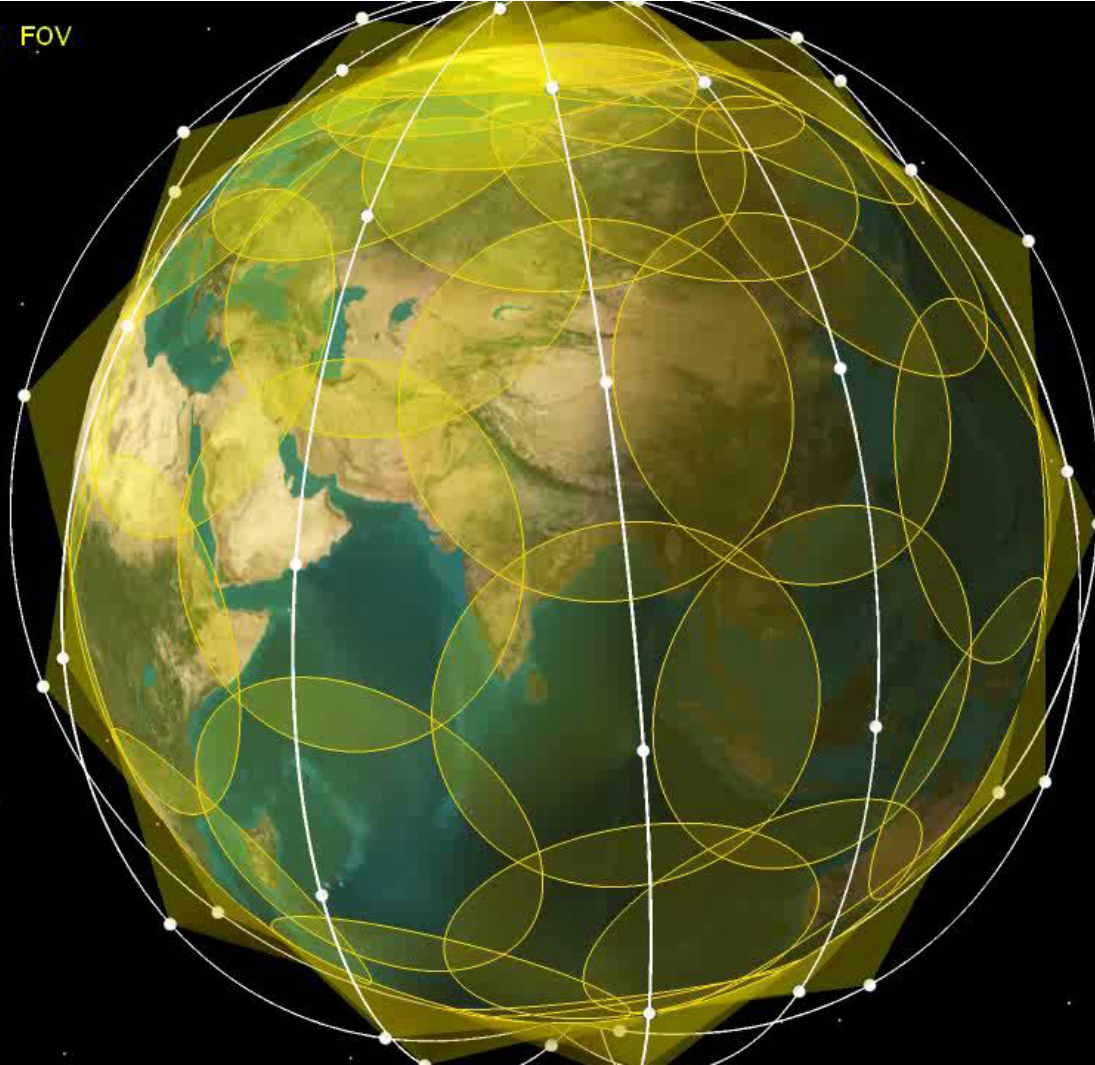# Iridium operations and development

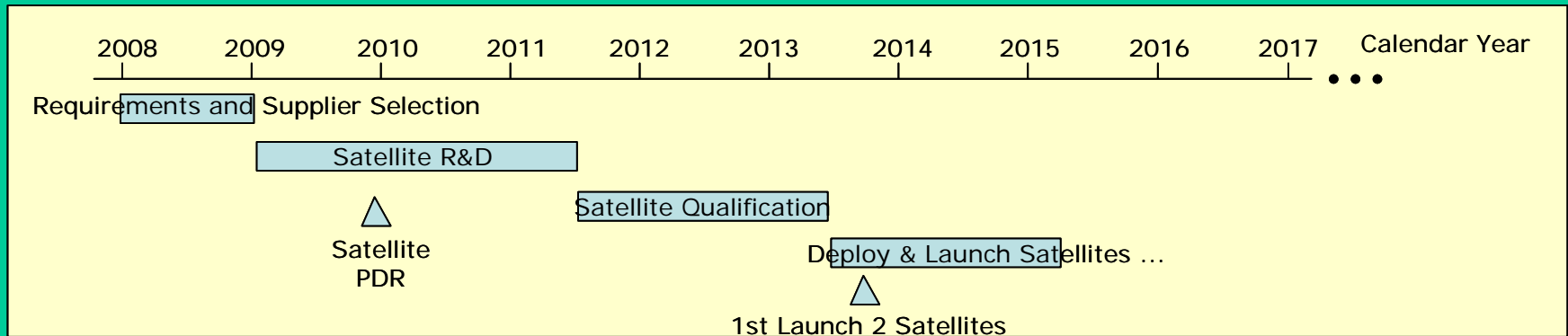## Update Sept 2012

66 Sensors with 62deg FOV

2007: Iridium constellation status and plans

Replenishment Program Summary
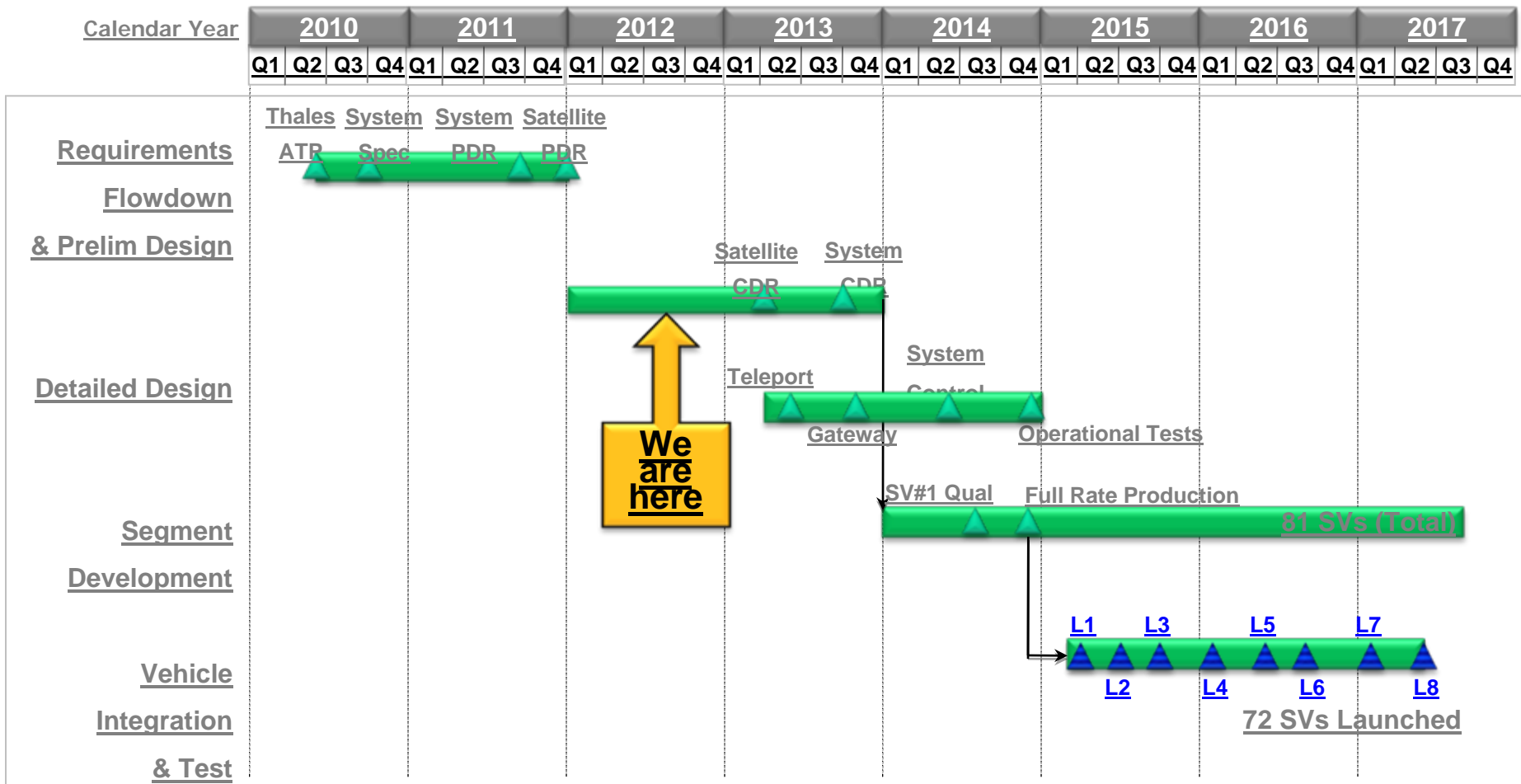
CY	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Satellite Replacement Profile																			
Failures	0	1	1	1	0	1	1	2	1	1	1	1	2	2	2	4	5	5	5
Original Orbit Spares	14	13	12	11	11	10	9	7	6	5	4	3	1	-1	-3	-7	-12	-17	-22
Replacements												2	4	2	2	4	4	6	4
Total Spares	14	13	12	11	11	10	9	7	6	5	4	5	7	7	7	7	6	7	6
Cum Replacements												2	6	8	10	14	18	24	28
Number of Launches												1	2	1	1	2	2	3	2

- **Expect to use up spares by 2015**
- **Expect to start new launches in 2013**

2012: Iridium NEXT Milestones

Calendar Year	2010	2011	2012	2013	2014	2015	2016	2017
	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4	Q1 Q2 Q3 Q4

Requirements Flowdown & Prelim Design

Thales ATR   System Spec   System PDR   Satellite PDR

Detailed Design

Satellite CDR   System CDR

Teleport   System Control   Gateway   Operational Tests

We are here

Segment Development

SV#1 Qual   Full Rate Production   81 SVs (Total)

Vehicle Integration & Test

L1   L3   L5   L7
L2   L4   L6   L8

72 SVs Launched

Iridium Commercial in Confidence

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Constellation Health and Performance 2012

- Block 1 continues to provide excellent service
  - ~98.5% call establishment rate
  - Mission planning tool provides ability to optimize operational activities
- Constellation lifetime outlook excellent
  - Despite recent SV26 failure, spacecraft attrition remains lower than predicted
  - Six on-orbit spares remain
  - Recent study of radiation effects indicates low susceptibility of spacecraft components

ISH 7 Day Rolling Average Establish Rate
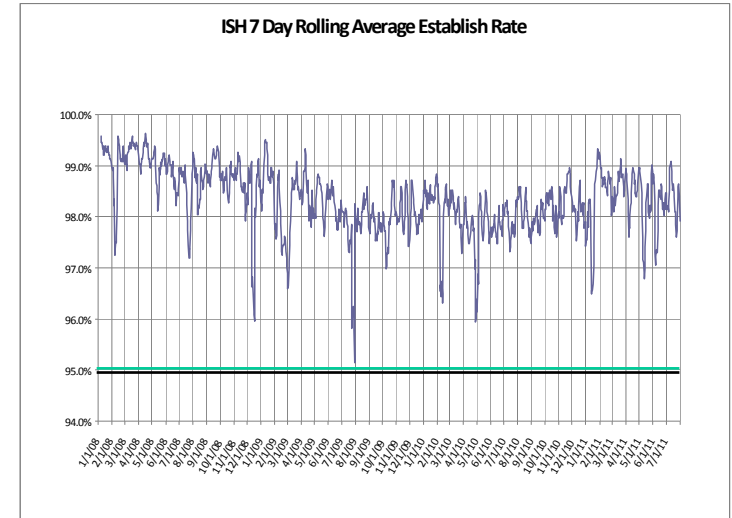
- Active management of spare satellites to maintain quality of service
- Real-time coordination with JSPOC following Nov 2009 collision ensures safety of flight

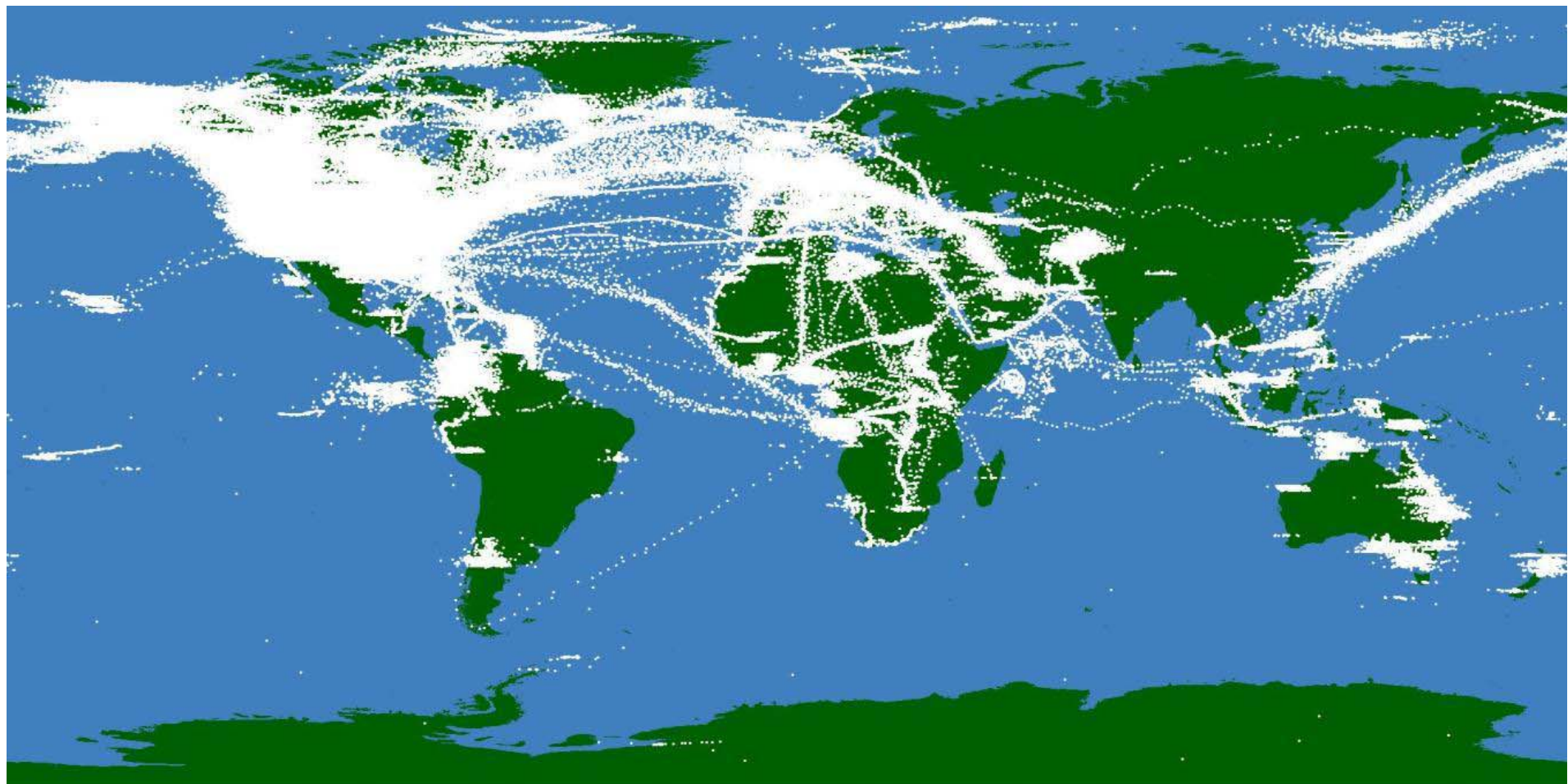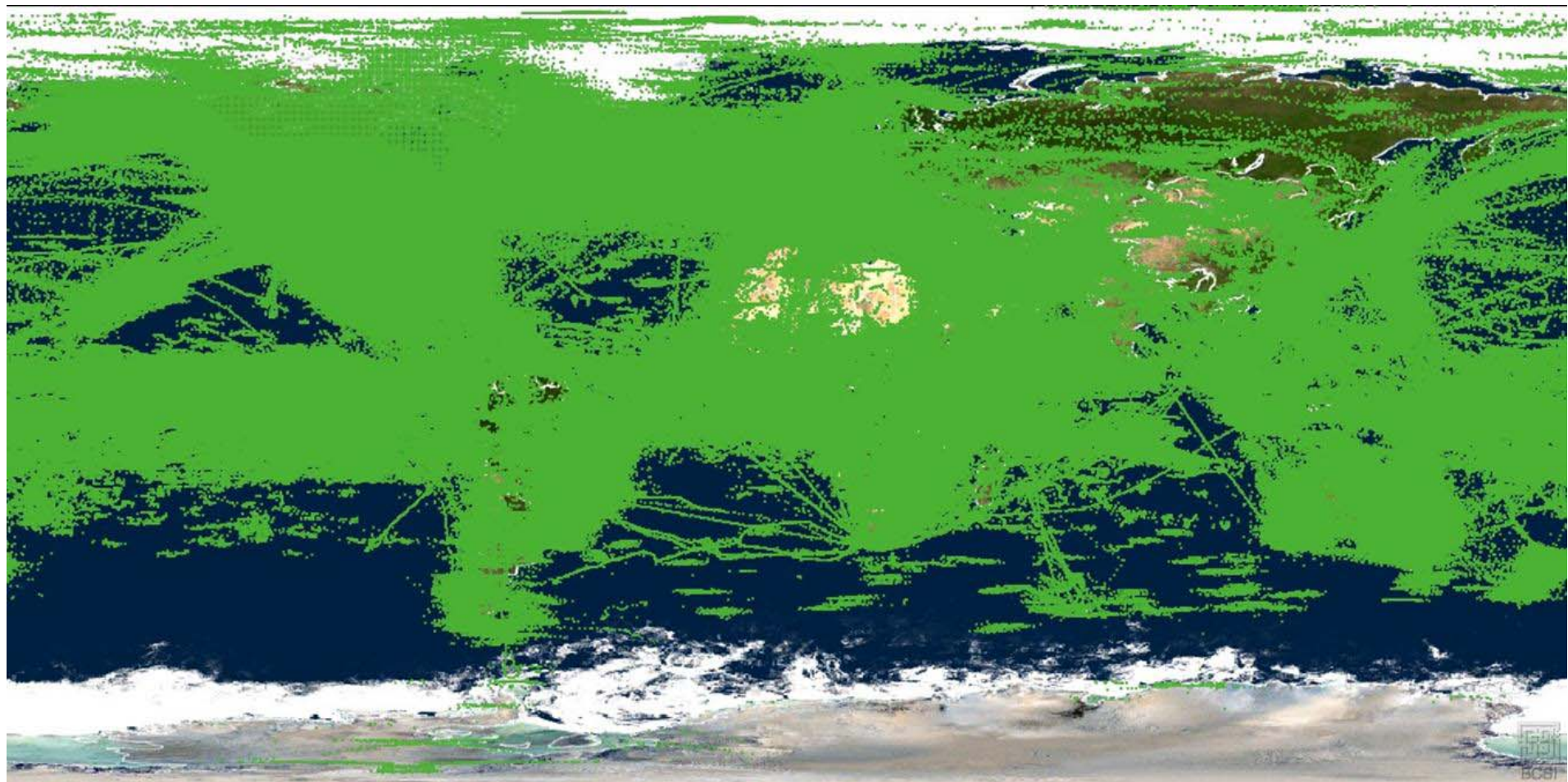# Iridium: global usage over 1 week
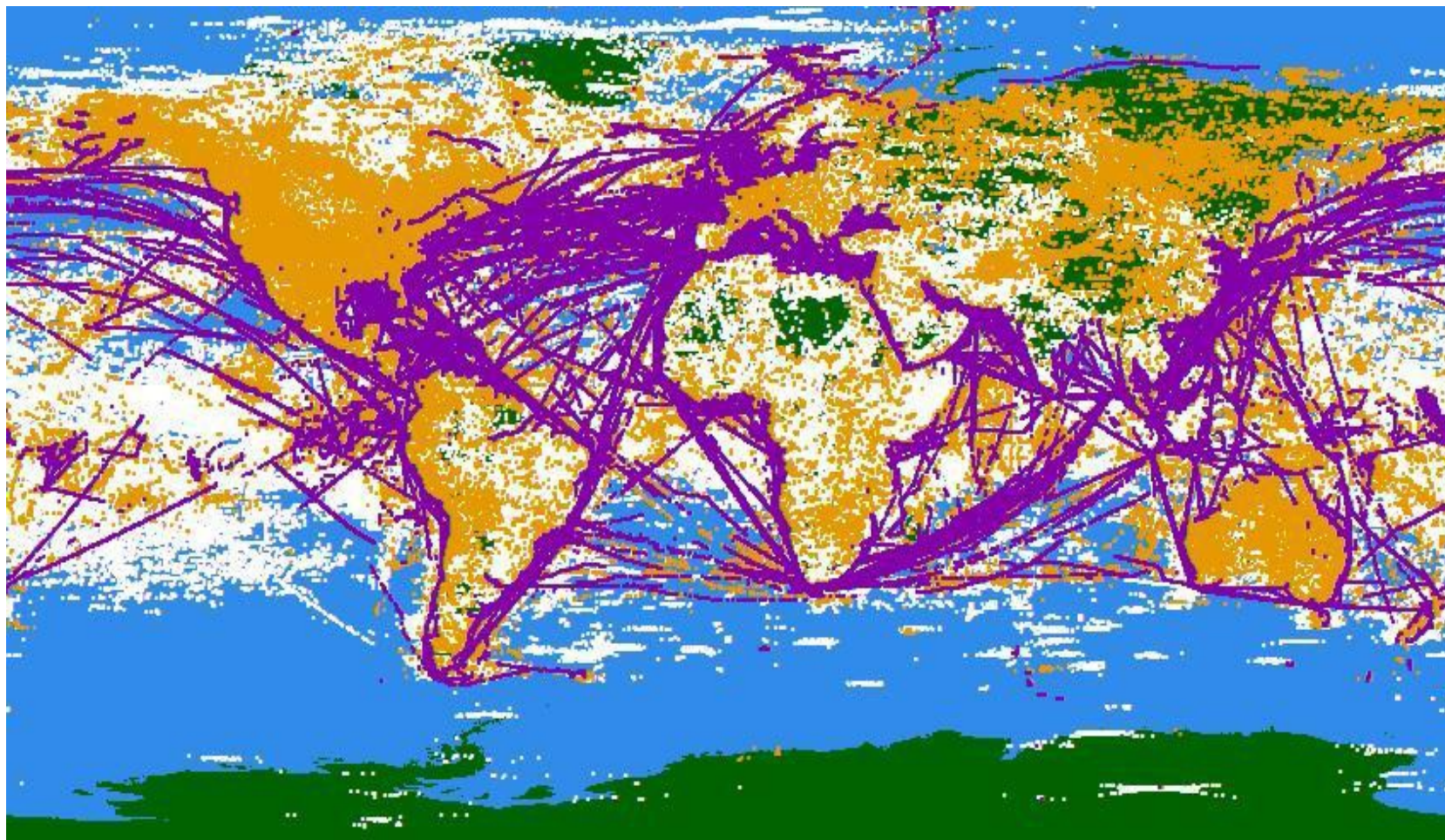
○ **M2M (SBD) Data Transmission**   🟠 **Voice Call**   🟣 **High-Speed Data Traffic**

SBD traffic for 1 month: 2006

SBD traffic for 1 month: 2012

Hardware evolution

9602

9603

Iridium Aero OpenPort

Pre-NEXT Devices

Iridium OpenPort

Enhanced Functionality Handset

U.S. DOD Tactical Radio (Netted)

Iridium 9505A

Iridium 9555

Low Cost Handset

Original Motorola Voice Handset

Voice & Data Modem

M2M 9601

Tridium 9522B

M2M 9602
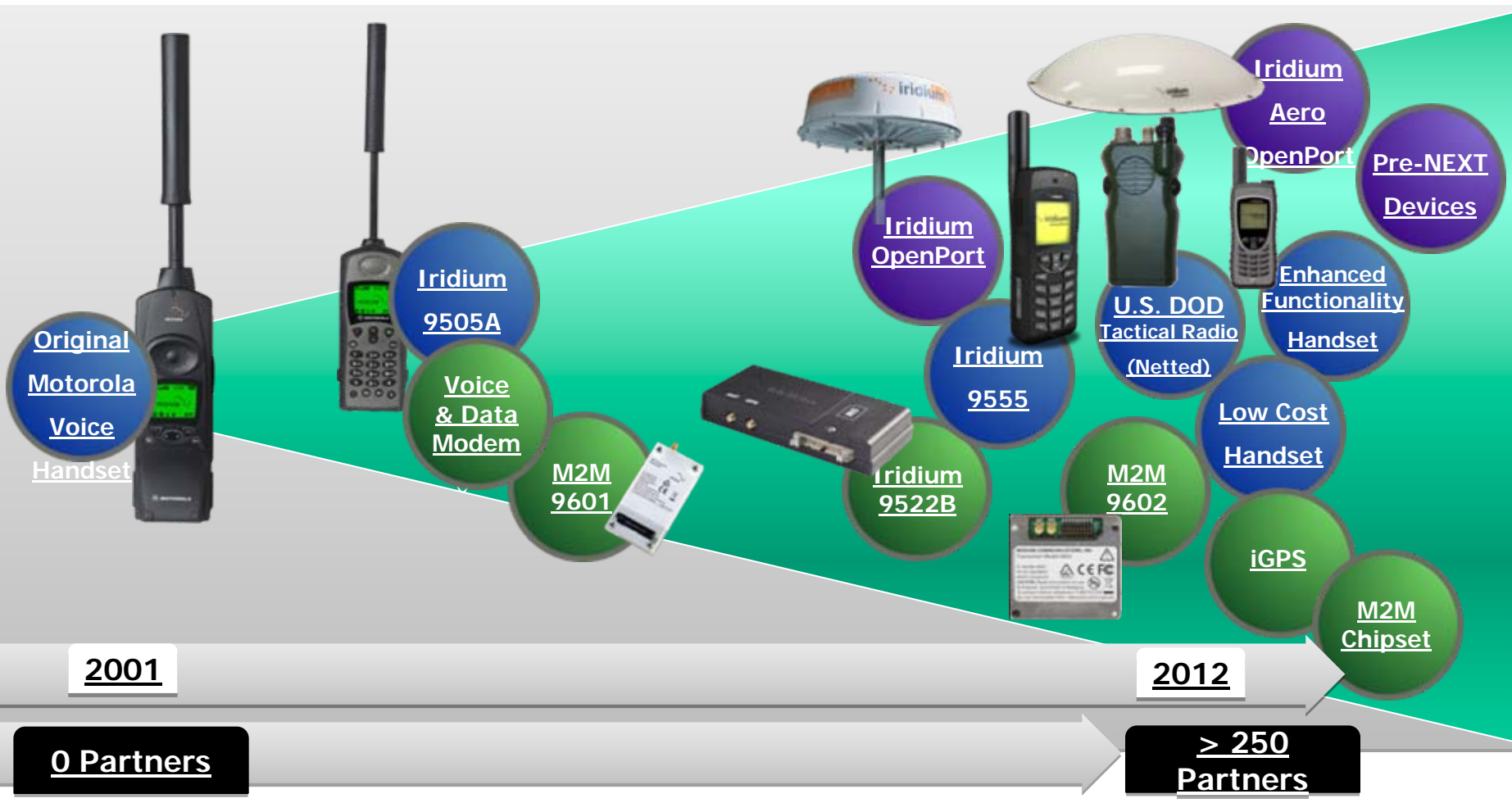
iGPS

M2M Chipset

2001

2012

0 Partners

> 250 Partners

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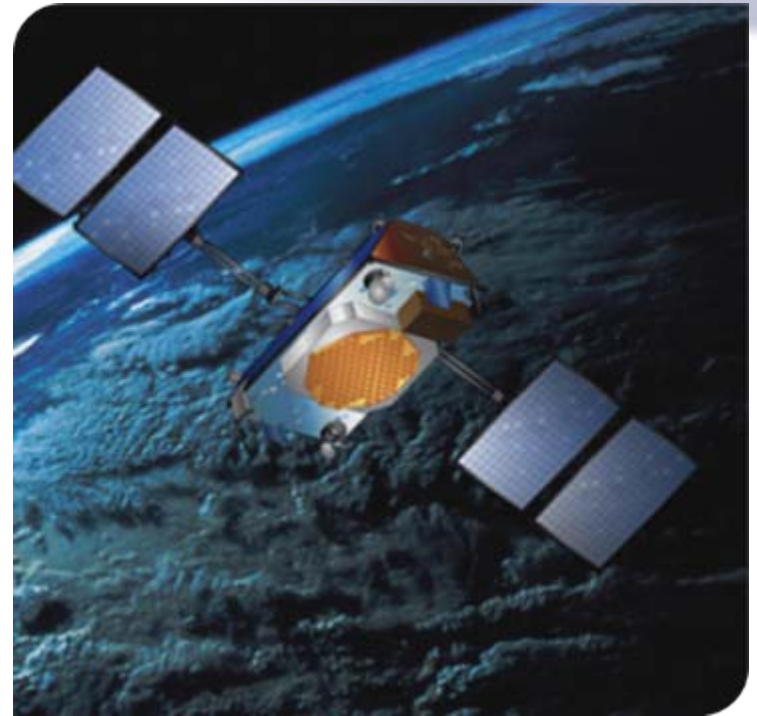
Iridium NEXT

- Comprehensive plan to replenish the Iridium constellation

- Retains LEO architecture with 66 new operational satellites, 6 in-orbit spares and 9 ground spares

- Scheduled deployment between early 2015 and 2017 via 8 x Falcon 9 launches (9 SVs/launch)

- Fully compatible with current constellation to simplify network transition and network continuity

- Ground architecture upgrade plan in progress

- Deployment approach designed to provide service continuity and backwards compatibility

- Significant advantages including expanded capacity, higher data speeds and ability to host payloads

- $3B plan for Iridium NEXT is fully financed and on schedule

  - Majority of funding comes from internal cash flows

  - $1.8B Coface-backed line of credit provides additional financing at attractive rates and terms

  - Expect $200-300M hosted payload contribution, but plan closes without this revenue

NEXT Services Evolution Planned

- NEXT architecture and new digital technology provides enormous flexibility for new services

- All current Iridium Legacy Services will be supported by the NEXT architecture
  - Legacy Services will be evolved to provide improved data rate and performance

- New types of NEXT-unique services will be introduced and will offer much higher data rates and capabilities

Legacy Services	Data Rates	Supportable Services	Data Rates
Voice	2.4 Kbps	Voice (MOS 3.5)	2.4 Kbps
Circuit Switched Data	2.4 Kbps	L-Band Handset Data	9.6 – 64 Kbps
SBD	Low Data Rate	SBD	Up to 64 Kbps
OpenPort Maritime/Land	<128 Kbps	OpenPort Maritime/Land	128 – 512 Kbps
OpenPort Aero	<128 Kbps	OpenPort Aero	128 – 512 Kbps
New Services:		L- band High Speed	512 Kbps – 1.5 Mbps
		Ka Band Portable and Transportable	8 Mbps
		Broadcast	64 Kbps

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NEXT Hosted Payload Accommodation

- Hosted payload capability is being designed into every satellite
- Provides unprecedented geospatial and temporal coverage
  - Low latency – Real-time relay of data to and from payloads in space
  - User control – Continuous 24x7 data collection and payload access
  - Cost effective - Capability at a fraction of the cost of a dedicated mission
  - Exclusive – No other opportunity like this is likely to be available for decades
  - Leverages $3B Iridium investment and supports National Space Policy
- DOD, IC, civil, scientific payloads under consideration
- Orbital Sciences Corporation has invested in a share of the hosted payload space
- AIREON (airplane tracking system) will fly as hosted payload

Iridium NEXT Hosted Payload Allocated Accommodations	
Weight	50 kg
Payload Dimensions	30 x 40 x 70 cm
Payload Power	50 W average (200 W peak)
Payload Data Rate	1 Mbps peak, Orbit average ~100Kbps

NEXT Spacecraft – Nadir view, stowed configuration

Hosted Payload

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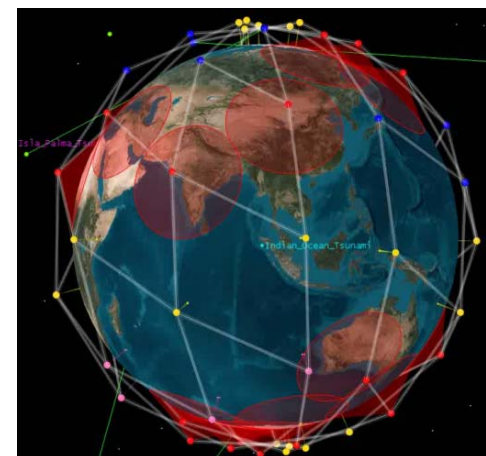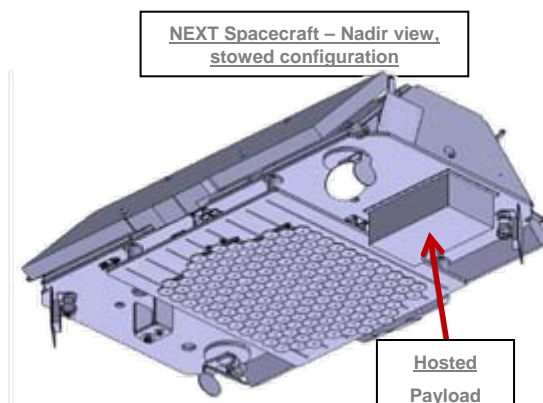
Summary

- Existing constellation still healthy
- New constellation ('NEXT') funded and on track for 2015 launch
- Backwards compatible
- Modem chipset under consideration
- Airtime costs currently ~$200/yr for SVPB reporting hourly
- How do we best exploit the service?
- The Iridium 1-Stop Shop?

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