



United States Strategic Command Space Situational Awareness Sharing Program Update

**United Nations Committee on the Peaceful Uses of Outer Space
Scientific and Technical Subcommittee
54th Session
Vienna, Austria
3 February 2016**

***Maj Gen Clinton Crosier
Director, Plans and Policy Directorate***

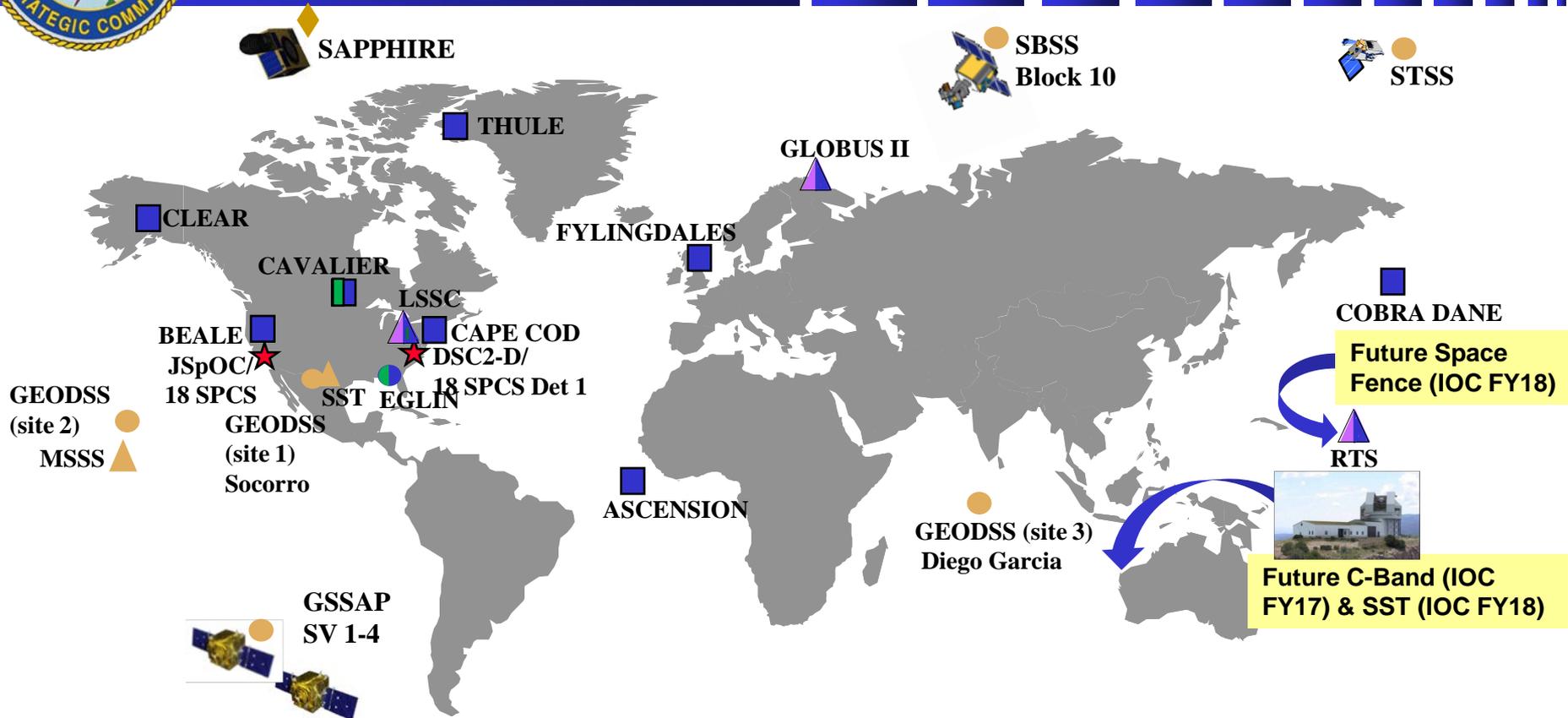


Overview

- **Space Surveillance Network**
- **Space Situational Awareness (SSA) Sharing Program**
- **SSA Agreement Benefits**
- **Satellite Operator Organizations Supported**
- **Conjunction Assessment and Collision Avoidance Process**
 - Screening Volumes
 - Conjunction Assessment Messages
 - Reporting Criteria
- **Collision Avoidance Maneuvers Confirmed by Operators**



Space Surveillance Network



Tracking Radar

Detection Radar

Imaging Radar

Optical Telescope

SSN C2

● Dedicated

■ Collateral

▲ Contributing

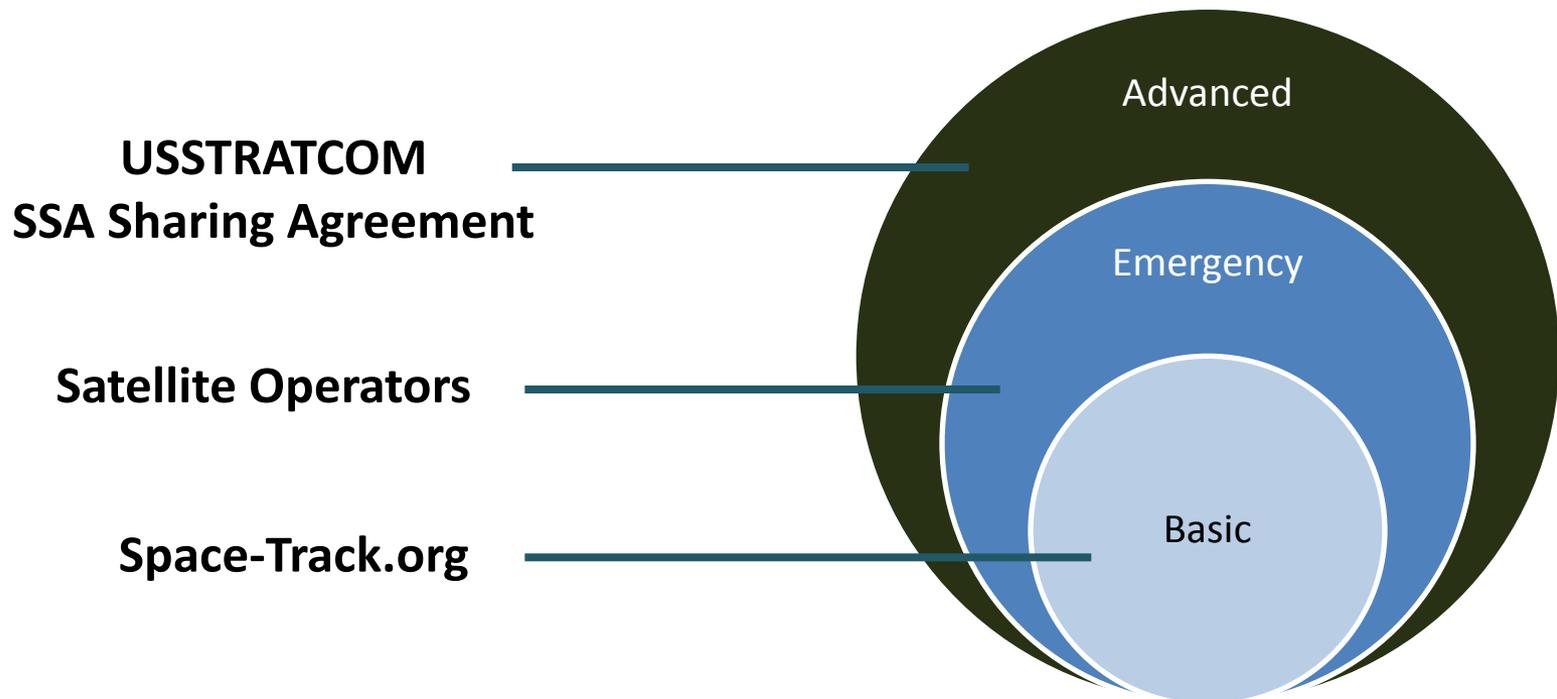
★ SSN C2

◆ Dedicated Int'l



USSTRATCOM SSA Sharing Program

- The Joint Functional Component Command for Space (JFCC SPACE) executes USSTRATCOM's SSA Sharing Program, which promotes the responsible use of space, advances spaceflight safety, and enhances space situational awareness (SSA) through the exchange of SSA information with the global space community.





SSA Agreement Benefits

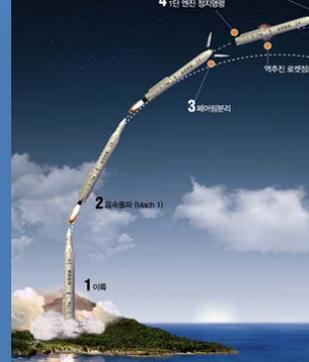
Pre-Launch Planning



Launch Collision Avoidance (COLA)



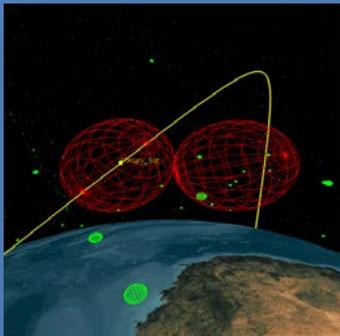
Launch Support



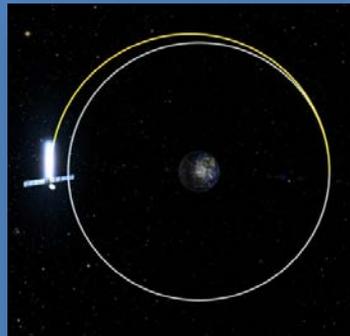
Early Orbit Conjunction Assessment (CA)



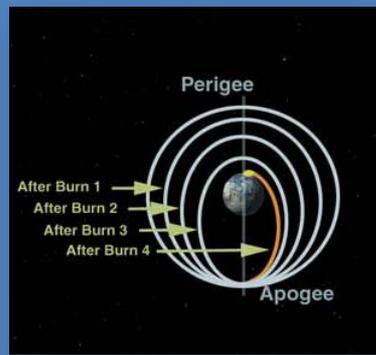
On-Orbit CA & COLA



End-of-Life / Disposal



Deorbit



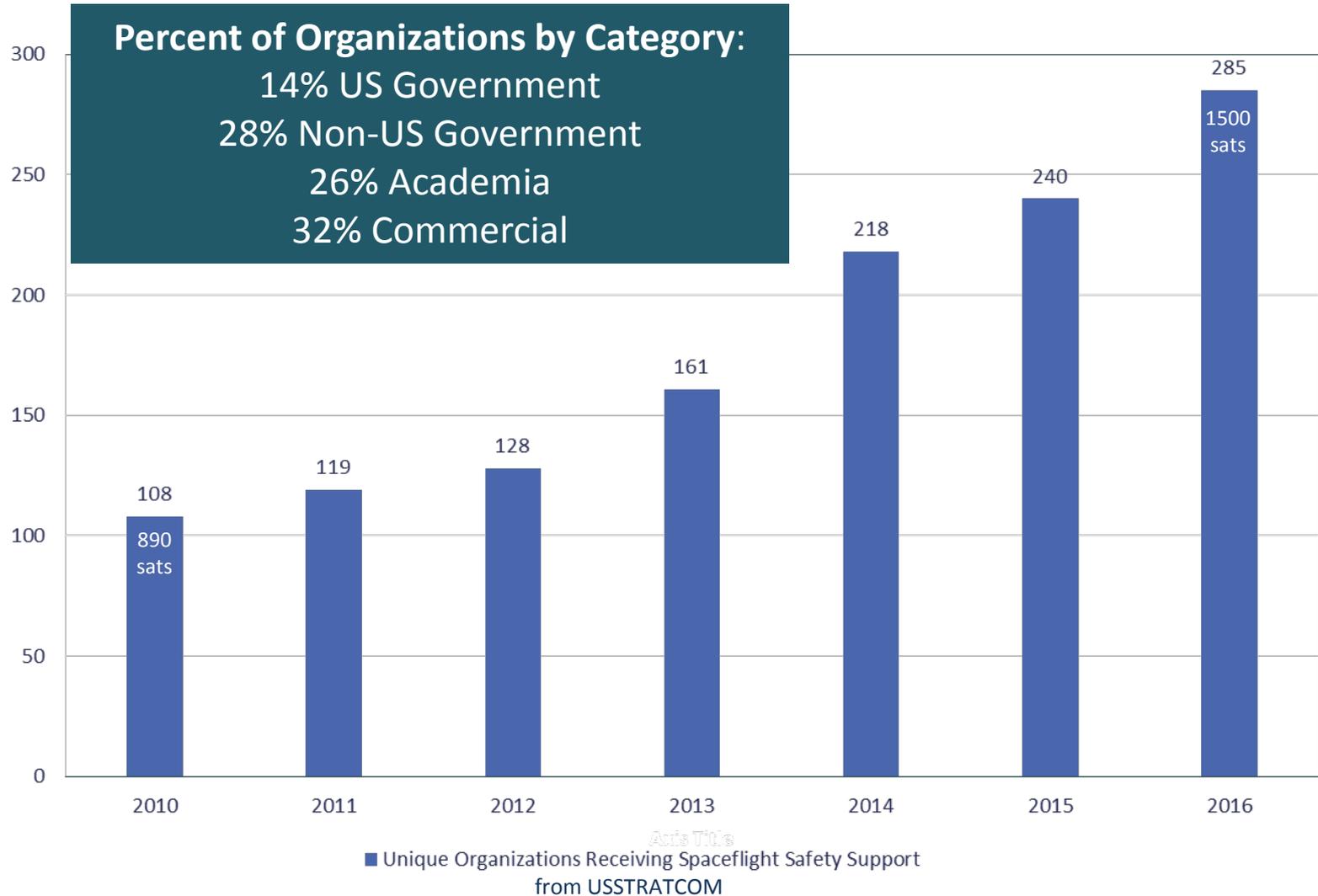
Reentry



<<<<<<<<<<< Anomaly Support >>>>>>>>>>>>>>



Satellite Operator Organizations Supported





CA/COLA Process

0-10 days prior to TCA

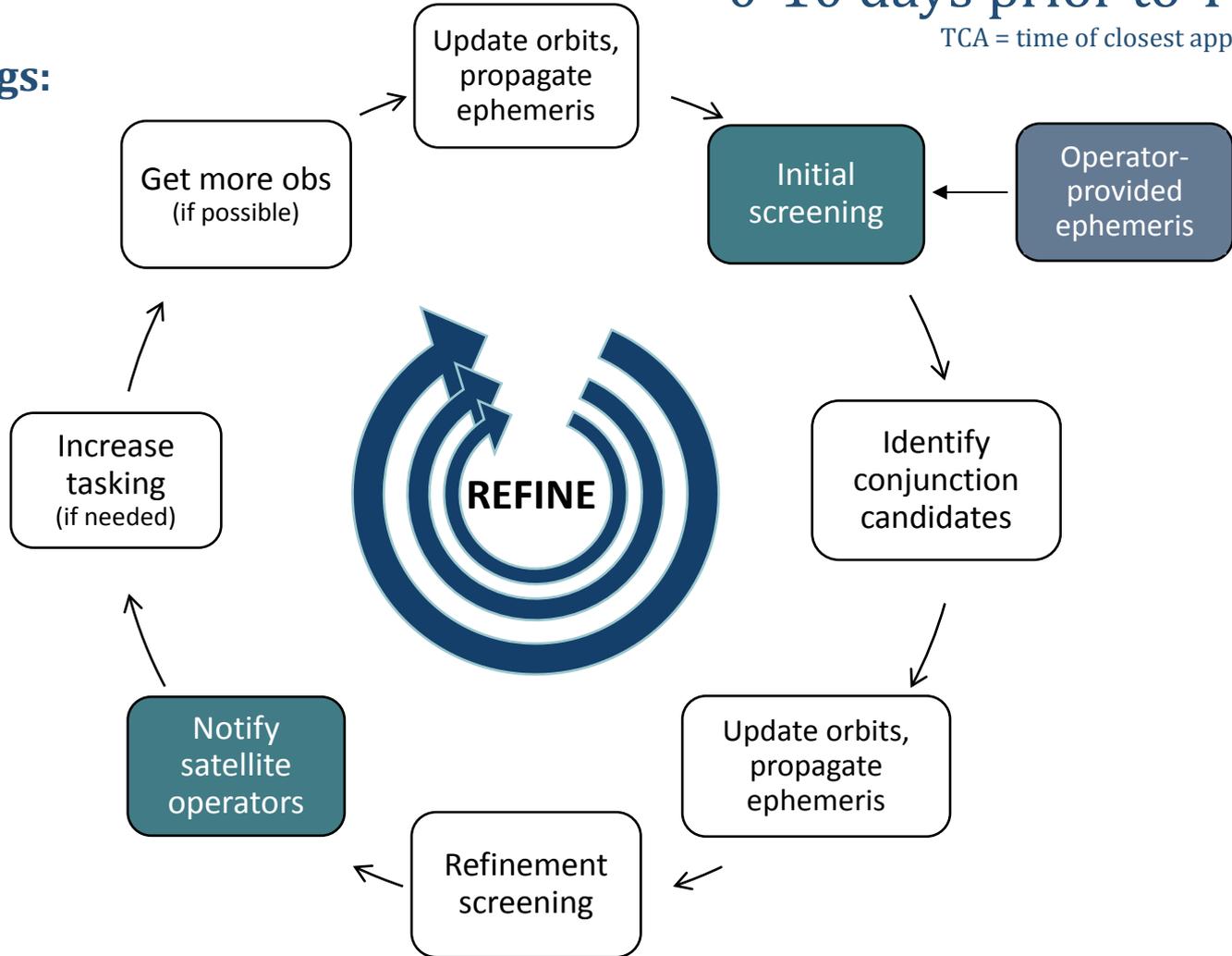
TCA = time of closest approach

High Accuracy Catalog Screenings:

Deep Space:
Every 24 hours
Near Earth:
Every 8 hours

Ephemeris Screenings:

High-Interest:
On demand
Deep Space
Routine:
Every 24 hours
Near Earth
Routine:
Every 8 hours





Screening Volumes

Orbit Regime	Orbit Regime Criteria/Definition	Predict/ Propagate/ Time	Radial (km)	In-Track (km)	Cross-Track (km)
GEO Advanced	1300min < Period < 1800 min Eccentricity < 0.25 & Inclination < 35°	10 days	20	20	20
HEO Advanced	Perigee < 2000 km & Eccentricity > 0.25	10 days	20	20	20
MEO Advanced	600 min < Period < 800 min & Eccentricity < 0.25	10 days	20	20	20
LEO 4 Advanced	1200 km < Perigee ≤ 2000 km & Eccentricity < 0.25	7 days	0.5	2	2
LEO 3 Advanced	750 km < Perigee ≤ 1200 km & Eccentricity < 0.25	7 days	0.5	12	10
LEO 2 Advanced	500 km < Perigee ≤ 750 km & Eccentricity < 0.25	7 days	0.5	28	29
LEO 1 Advanced	Perigee ≤ 500 km & Eccentricity < 0.25	7 days	2	44	51
Deep Space Basic	GEO, HEO, MEO	10 days	10	10	10
Near Earth Basic	LEO 1 – LEO 4	7 days	1	1	1
Deep Space Ephemeris	GEO, HEO MEO	10 days	20	20	20
Near Earth Ephemeris	LEO 1 – LEO 4	7 days	2	25	25



Conjunction Assessment Messages

Operator Panel

CDM Directory Manage Admin Help

CDM:

Organizations: CDM Account

TCA Start Date (UTC): 2014-06-06

TCA End Date (UTC): 2014-09-23

Load CDMs

Show 10 entries

Search All Columns:

CONSTITUTION	MESSAGE ID	CREATED	SAT 1 ID	SAT 1 NAME	SAT 2
CDM Account	27431_conj_30739_2014167161545_16512380434	2014-06-14 12:09:25	2002-024B	FENGYUN 1D	1999-025AS
CDM Account	27431_conj_30739_2014167161545_16613043442	2014-06-15 12:22:35	2002-024B	FENGYUN 1D	1999-025AS
CDM Account	27431_conj_30739_2014167161545_16712161227	2014-06-16 10:06:49	2002-024B	FENGYUN 1D	1999-025AS
CDM Account	27431_conj_12457_2014242225920_240121557621NE	2014-08-28 10:27:09	2002-024B	FENGYUN 1D	1981-0
CDM Account	27431_conj_12457_2014242225920_241112654629NE	2014-08-29 10:02:51	2002-024B	FENGYUN 1D	1981-0
CDM Account	27431_conj_12457_2014242225920_242095352682NE	2014-08-30 07:41:15	2002-024B	FENGYUN 1D	1981-0
CDM Account	27431_conj_82525_2014253110836_251094945656NE	2014-09-08 07:43:35	2002-024B	FENGYUN 1D	UNKNO
CDM Account	27431_conj_82525_2014253110836_252093944656NE	2014-09-09 08:08:40	2002-024B	FENGYUN 1D	UNKNO

The United States Joint Space Operations Center (JSPOC) has identified a close approach between COMMON NAME (SCC# XXXXX) and SCC#XXXXX

Time of Closest Approach: 2014/09/12 04:20:55.000(UTC)

Overall miss distance: 333.0m

Radial miss distance (RELATIVE_POSITION_R): 165.5m

In-Track miss distance (RELATIVE_POSITION_T): 163.0m

Cross-track miss distance (RELATIVE_POSITION_N): -239.8m.

Please reply to us to acknowledge that you received this close approach notification. (Replying to this email will send your message to JSPOCSpaceCorrespondence@us.af.mil)

For more information on this close approach, including covariance values, the full Conjunction Data Message (CDM) is available after logging in to the Space-Track website at this link https://www.space-track.org/expandedspacedata/query/class/cdm/CONSTITUTION/ALL/MESSAGE_ID/36413_conj_31485_2014255042055_2520939441037NE/formats/kvn/emptyresult/show

If you do not have a Space-Track account please apply for one here: <https://www.space-track.org/auth/createAccount> and then contact js poc.sssharing@us.af.mil for access to Conjunction Data Messages.

If you would like another estimate using your ephemeris, please send it to JSPOCSpaceCorrespondence@us.af.mil as an attachment in the format shown in this document: https://www.space-track.org/documents/Ephemeris_Format_10Apr14.pdf using this naming convention: https://www.space-track.org/documents/JSPOC_File-Naming_Scheme.pdf

Thank you for your time and assistance. Please contact us if you have questions.

Very Respectfully,

JSPOC Orbital Protection Team
Vandenberg Air Force Base, California USA
Commercial:1-805-605-3533
JSPOCSpaceCorrespondence@us.af.mil

Conjunction Data Messages (CDM)

- Conjunction **data**
- Provided for all events within Space-Track CDM criteria
- Consultative Committee for Space Data Systems (CCSDS) standard
- Posted to Space-Track.org for access by registered spacecraft owner/operator
- Thousands of initial messages and updates posted daily

Close Approach Notification (CAN)

- Conjunction **warning**
- Provided for all events that USSTRATCOM considers an emergency
- USSTRATCOM-specific message
- Emailed to satellite operator
- Average 10 per day



Reporting Criteria

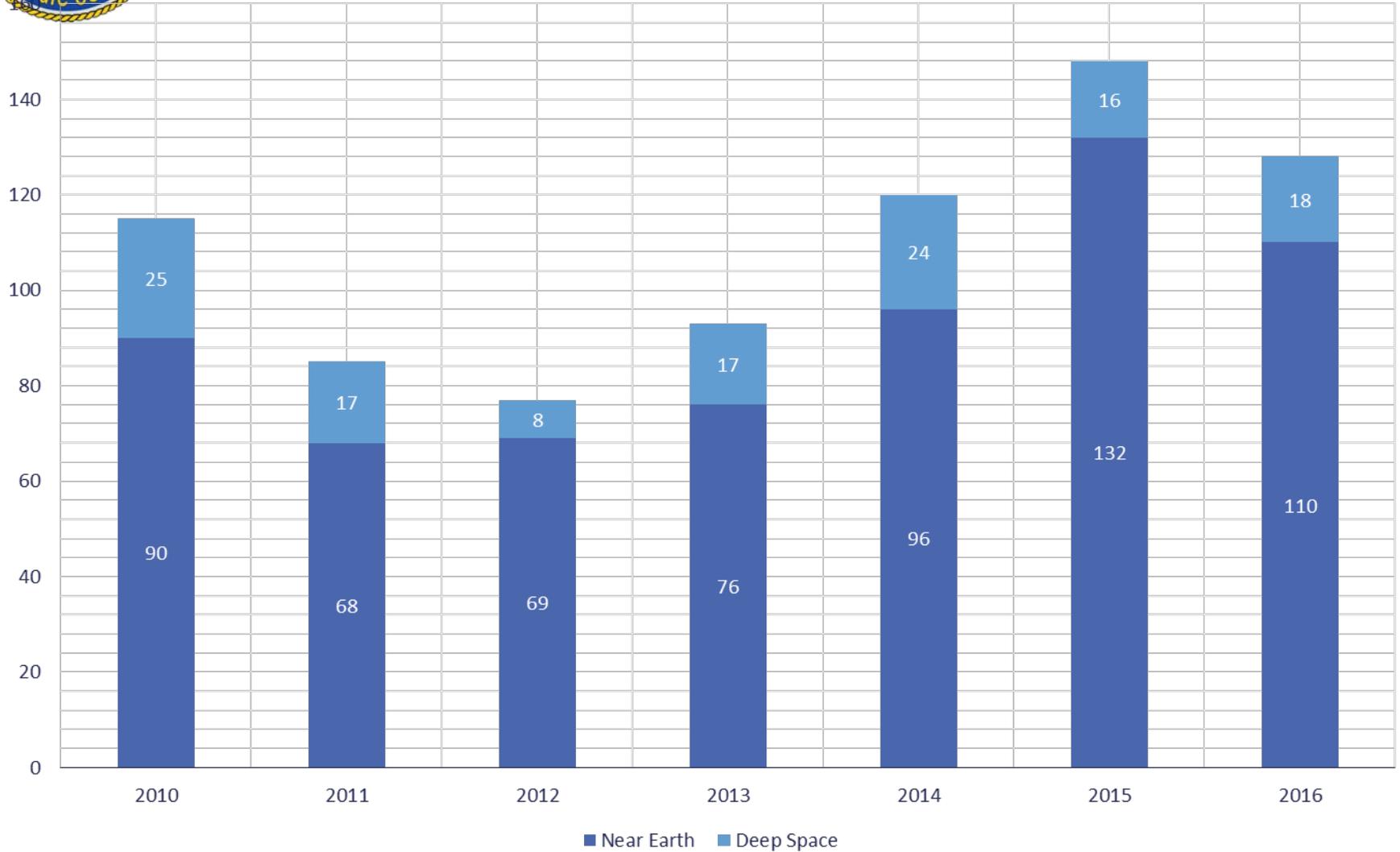
	Space-Track CDM Criteria	Emergency Criteria	Emergency Phone Call Criteria
Notification Method:	CDM	CDM & CAN email	CDM, CAN email & phone call
GEO	(1) Basic: TCA \leq 10 days & Overall miss \leq 10km (2) Advanced: all results within advanced criteria	TCA \leq 3 days & Overall miss \leq 5km	TCA \leq 3 days & Overall miss \leq 500m
HEO	(1) Basic: Reporting based on regime of secondary object in the conjunction using miss distance criteria only (2) Advanced: all results within advanced criteria		
MEO	(1) Basic: TCA \leq 3 days & Overall miss \leq 5km (2) Advanced: all results within advanced criteria	TCA \leq 3 days & Overall miss \leq 5km	TCA \leq 3 days & Overall miss \leq 500m
Near Earth (LEO 1 – 4)	(1) Basic: TCA \leq 3 days & Overall miss \leq 1km & Pc \leq e ⁻⁴ (2) Advanced: all results within advanced criteria	TCA \leq 3 days & Overall miss \leq 1km & Pc \leq e ⁻⁴	TCA \leq 3 days & Overall miss \leq 75m & Pc \leq e ⁻²

TCA = time of closest approach

Pc = probability of collision



COLA Maneuvers Confirmed by Operators





Thank You

If your nation is interested in an SSA Sharing Agreement, please contact the:

USSTRATCOM Space Policy Branch

+1.402.232.7256

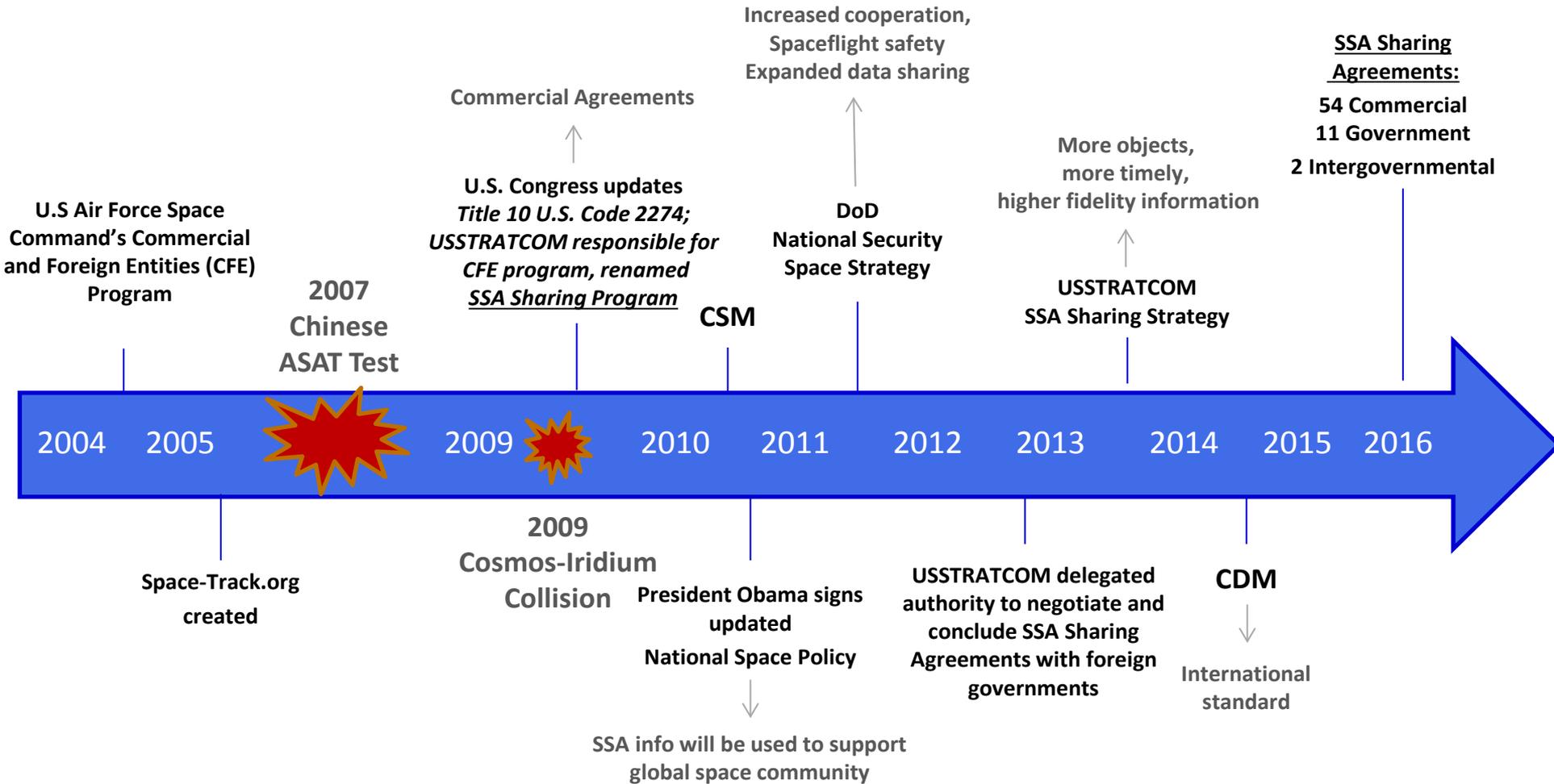
stratcom.offutt.j51.mbx.j513@mail.mil

or

www.space-track.org



SSA Sharing History





Increased Tasking Criteria

- **If either object identified in a conjunction event meet one of the following criteria, sensor tasking will be increased:**
 - Not tracked by the Space Surveillance Network (SSN) within 72 hours
 - Fewer than 20 observations used in the orbit determination
 - 2 or fewer sensors contributing to the current orbit determination
 - 1 component of covariance over 100,000 m²