SAR/BDS Service Status 2019

14th Meeting of the International Committee on
Global Navigation Satellite Systems

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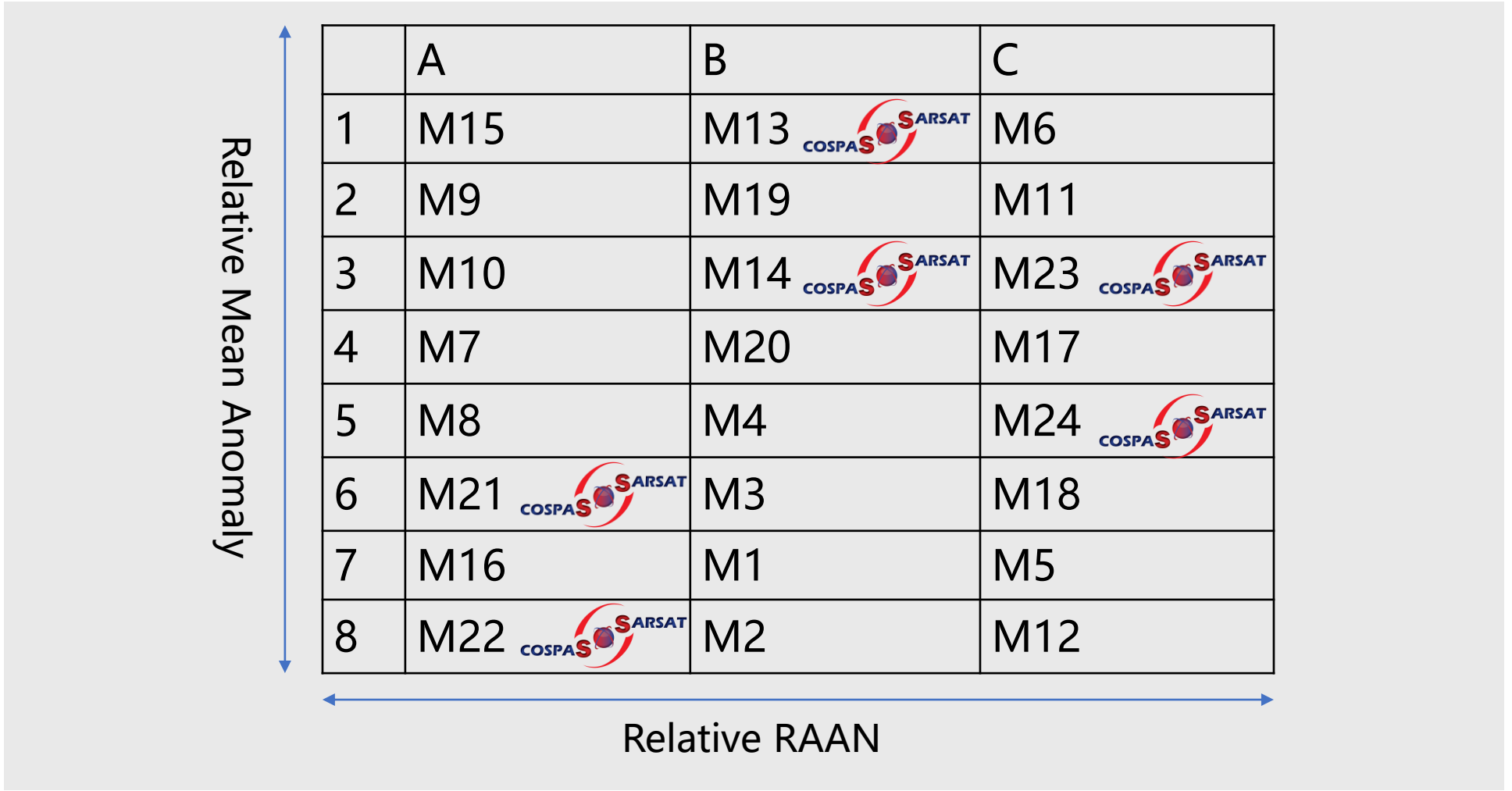
CONTENT

01 SAR/BDS Space Segment

- 6 MEOSAR in 3 planes
- More details in JC-32-Inf-54.pdf
  DEVELOPMENT PLAN FOR SAR/BDS

Satellite	Plane and slot	Launch Date(UTC)
M13, M14 (C32, C33)	B1, B3	**2018/09/19**
M23, M24 (C45, C46)	C3, C5	**2019/09/22**
M21, M22 (C43, C44)	A6, A8	**2019/11/23**

01 SAR/BDS Space Segment



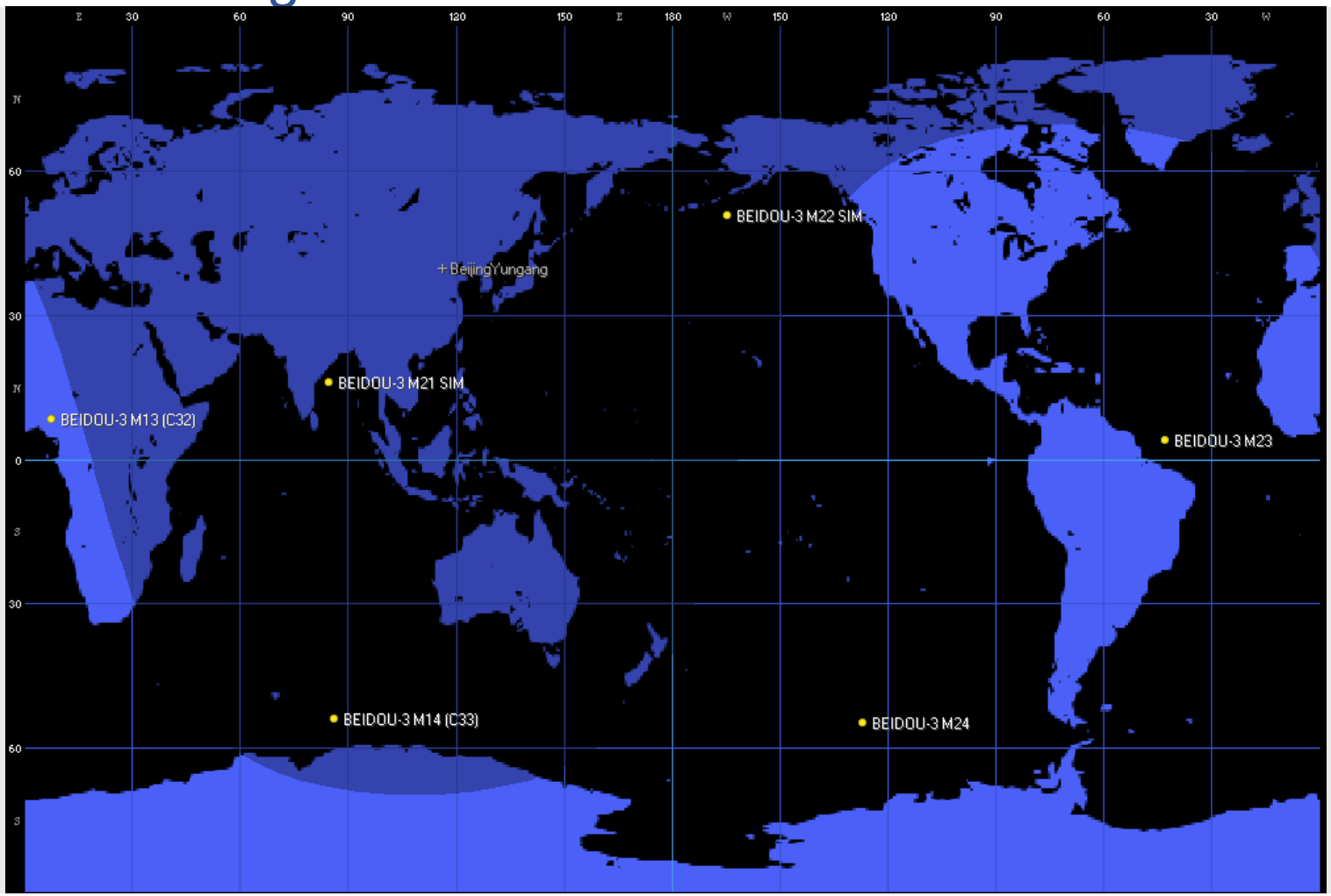
	A	B	C
1	M15	M13	M6
2	M9	M19	M11
3	M10	M14	M23
4	M7	M20	M17
5	M8	M4	M24
6	M21	M3	M18
7	M16	M1	M5
8	M22	M2	M12

Note: Number is satellite common name, not in launch sequence. RLM available for all MEO satellites.

01

SAR/BDS Space Segment

Coverage Simulation



02

SAR/BDS Ground Segment

Beijing MEOLUT

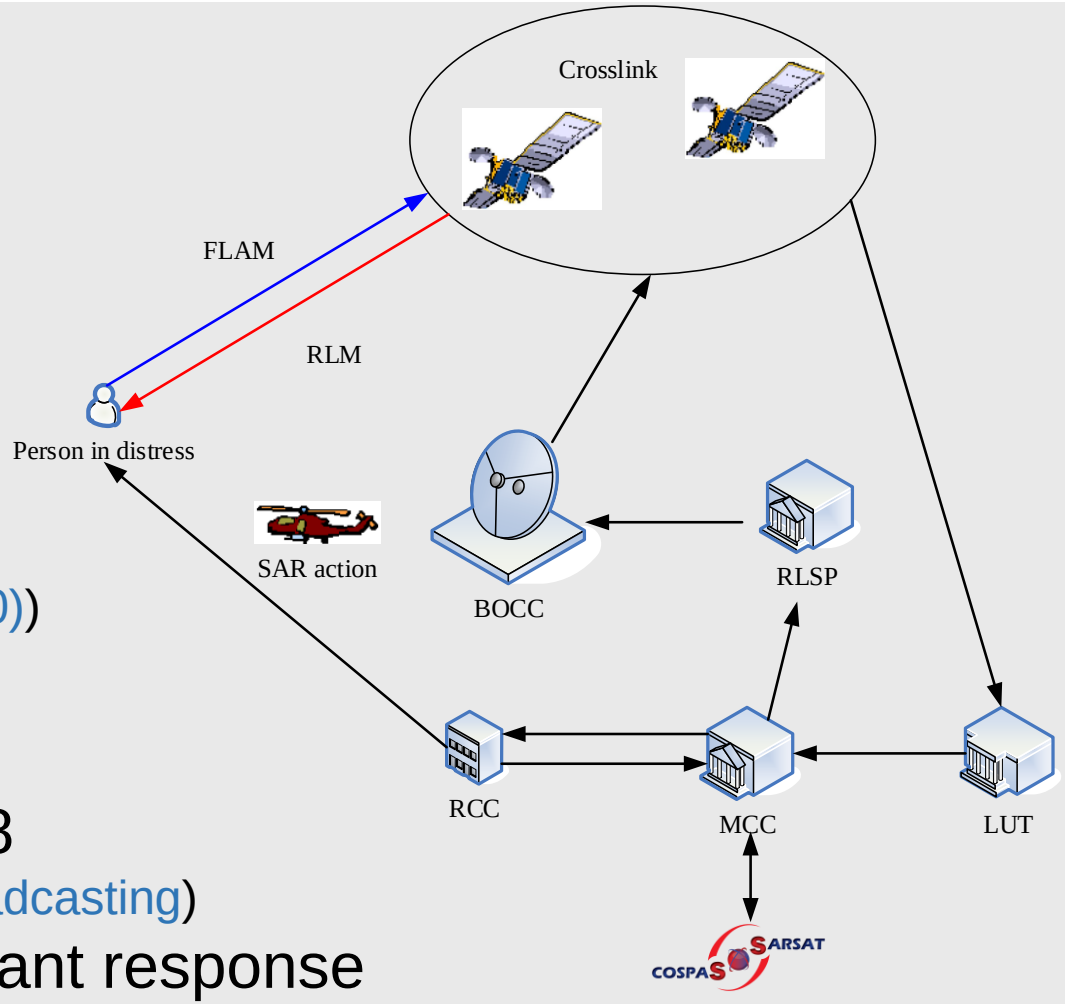
6 L/S Antenna
Plan to commissioning in early 2020.

03

SAR/BDS Return Link Service

RLS system structure

- 24 MEO + 3 IGSO
- B2b Signal
  (1207.14MHz, ACEBOC-QPSK(10))
- Information rate is 500 bps
- Frame length is 1 sec
- Dedicated message type: 8
  (Type 9 for safety information broadcasting)
- High priority to achieve instant response

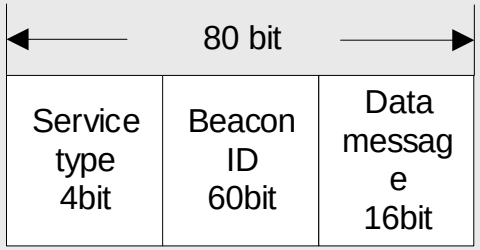


03 SAR/BDS Return Link Service

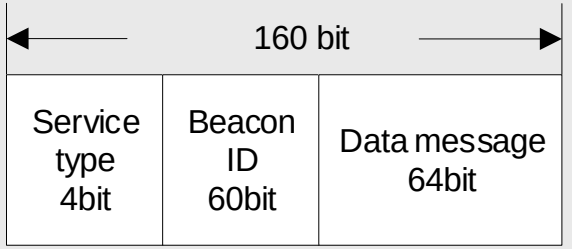
Preliminary RLM frame Structure

- Multiple sub-frame in a single type 8 frame
- 3 types of sub-frame for 3 types of RLM
- Type 3 RLM is BDS exclusive.

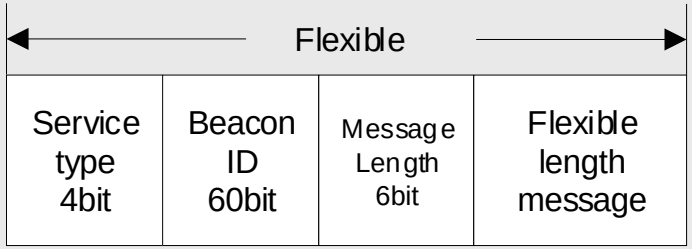
Type1 RLM



Type2 RLM



Type3 RLM



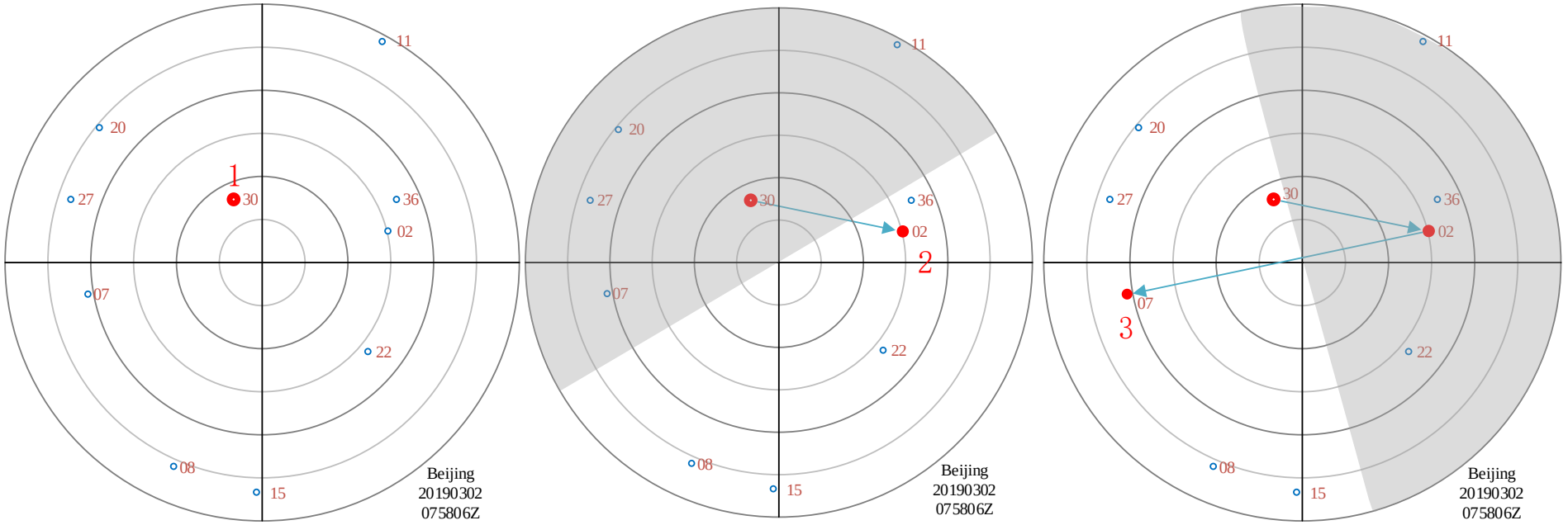
03 SAR/BDS Return Link Service

Space-to-user redundancy

- GNSS antenna may covered by wreckage.
- RLM space-to-user redundancy is needed.
- Strategy needed.
  - Spatial strategy - path redundancy
  - Temporal strategy – time redundancy

03 SAR/BDS Return Link Service

Broadcasting strategy - Spatial strategy (SIS)



scheme1 (1 satellite, clear sky)	Choose an available satellite with highest elevation on distress location/alert region.
scheme2 (2 satellites, small shelter)	Block satellites with ±90 degrees azimuth of last used satellite, choose an available satellite with highest elevation.
scheme3 (3 satellites, medium shelter)	Block satellites with ±90 degrees azimuth of last used satellite and all used satellites, choose an available satellite with highest elevation.

03 SAR/BDS Return Link Service
Based on SAR scenario

Terminal type	scenario	Scheme
EPIRB-Sea	Sea vessel distress	#1
ELT-DT-Sea	Ditch	
PLB-Sea	MOB	
EPIRB-Land	River vessel distress	#2
ELT-DT-Land	Crash	#3
PLB-Land	Lost/Earthquake/Avalanche/Flood	

03 SAR/BDS Return Link Service

Broadcasting strategy - Timing strategy

- A single message may broadcast for N times
- Wait for M second for another frame
- Follow GNSS receiver power on time in C/S T.001/T.018.

1st RLM	Wait for M second	2nd RLM	Wait for M second	...	N-1th RLM	Wait for M second	Nth

03 SAR/BDS Return Link Service

Expected RLS/BDS Performance

- Global capacity: 6000 RLM / hour
- Maximum delay: < 2 min
- Still Testing

04 International Cooperation

- Space segment testing and commissioning
- Grounding segment construction and commissioning
- RLS Testing
- RLS Demonstration

- Frequency Coordination

Create a Community of Shared Future for Mankind.

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