



Future Architecture for US Government Satellite Operations

Major Michael J. Ward, USAF
ODASD(C3ISR&S) Space Systems
6000 Defense Pentagon
Washington, DC 20301-6000

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Overview

- Transition Strategy/Constraints
- Transition to “In-Band” Primary SATOPS
- Shared Network for LEO&A
- Increased Autonomy
- Transition LEO&A Operations to USB
- Implementation Schedule



Transition Strategy

- The SATOPS Transition Plan (dated 17 Nov 00) is a joint DoD, NASA and NOAA plan to achieve an interoperable satellite operations network in the 2020-2025 timeframe, based on these guidelines...
 - Incorporate changes during or before design phase, including block upgrades
 - Constrain funding to fit within the current and projected budget profile
 - Support legacy systems (both space and non-space) during transition



Constraints

- “Satellite Operations” is defined here to include launch, early orbit activities, and anomaly resolution (LEO&A); and tracking, telemetry, and commanding (TT&C).
 - It excludes support of mission data, user ground facilities
 - It excludes non-government space activities.
- The transition plan establishes the recommendations as ‘goals’ but did not perform detailed analyses of cost or operational impacts
 - Individual stakeholders responsible for implementation
 - Users and program offices use mission needs and cost/benefit analyses to guide their decisions



Transition to “In-Band” Primary SATOPS

- Perform routine TT&C functions in the high data rate mission bands rather than at lower data rate bands such as Space-Ground Link Subsystem (SGLS) or Unified S-Band (USB)
- Reserve lower data rate bands for LEO&A operations, small research & development satellites, and legacy systems

***Benefit:** Reduces loading on ground system and reduces bandwidth required for normal operations*



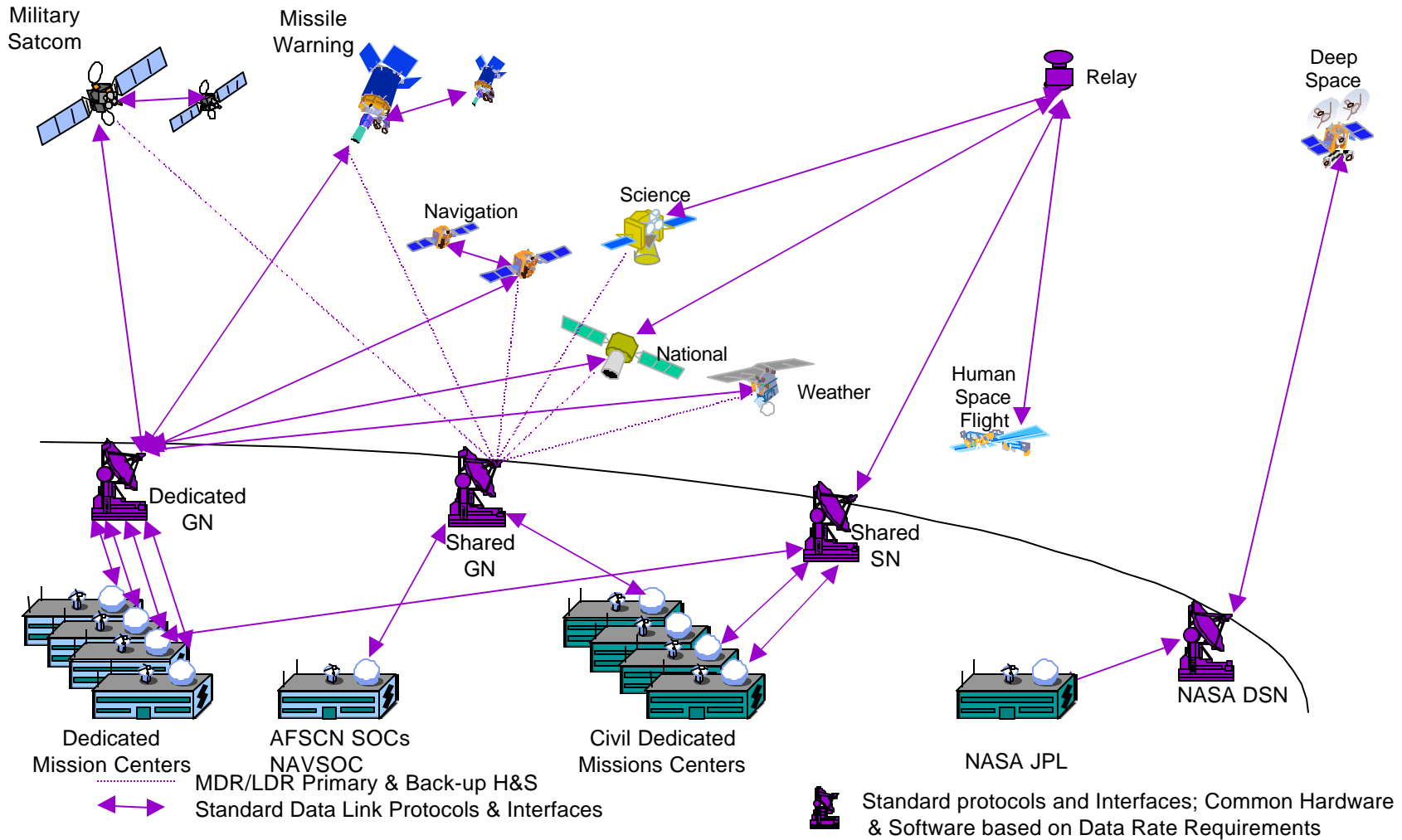
Shared Network for LEO&A

- Establish a single government-wide network for LEO&A and low data rate operations
- Flexible, robust network available for all the services, NASA, NOAA, and the NRO
- Requires development and use of common protocols and standards and use of spectrum efficient waveforms
- Includes use of a space based relay capability-- currently, AFSPC has no requirement for a space-based relay

Benefit: Increases interoperability. Reduces infrastructure and manning



Future Architecture



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Increased Autonomy

- Increase autonomy for both ground and space systems
 - Use GPS metric tracking for autonomous navigation
 - Develop and use more effective human/machine interfaces
 - Use of expert systems
 - Use of Commercial Off The Shelf (COTS) products and open architectures

***Benefit:** Reduces bandwidth required for radiometric tracking, reduces system loading (less number of contacts), reduces ground infrastructure*



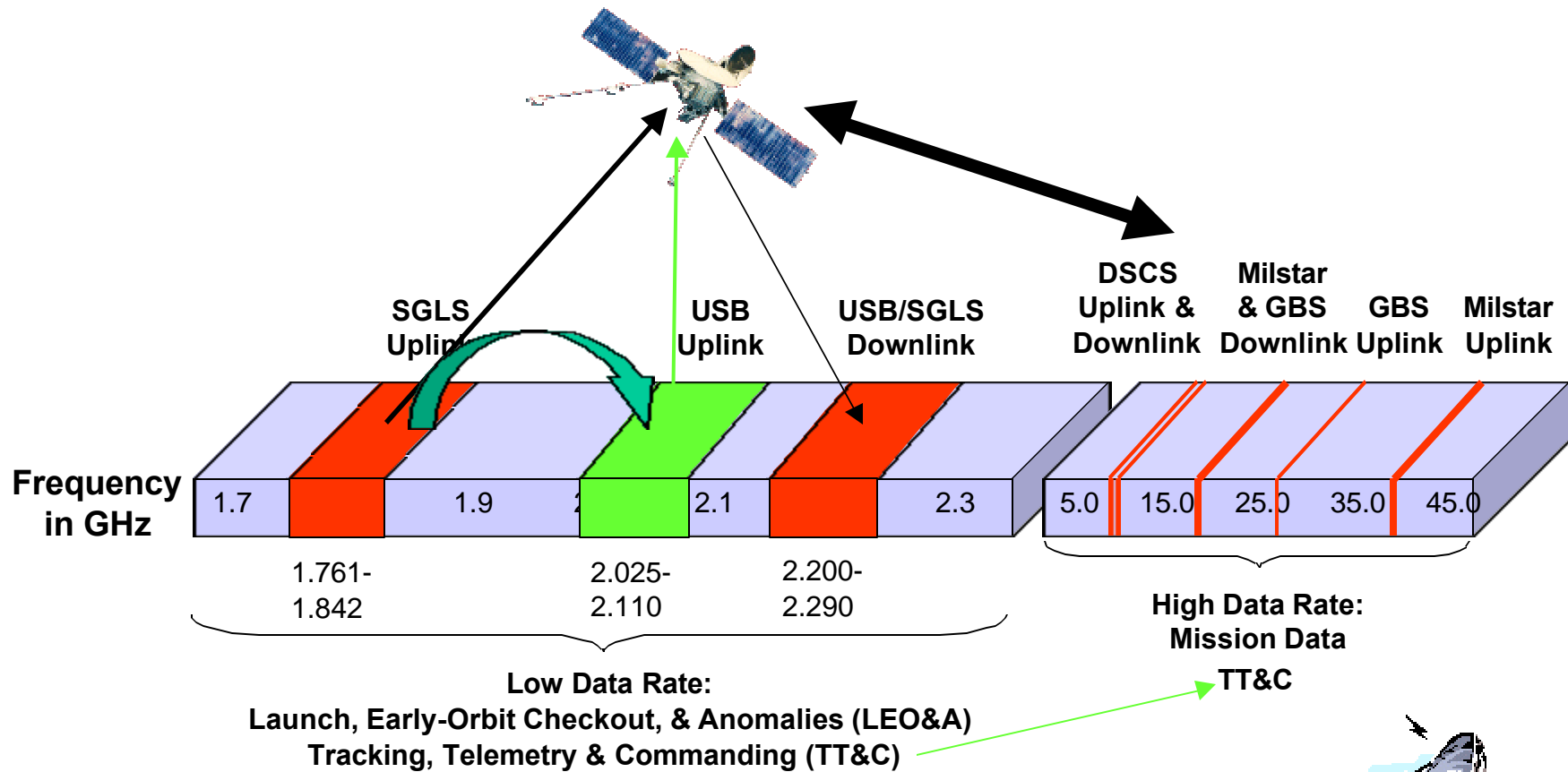
Transition LEO&A Operations to USB

- Transition LEO&A and low data rate uplinks from SGLS to USB, estimated transition completed in 2020-2025
 - Priority is to fly out legacy systems
- Use dual-mode transmitters and receivers (SGLS and USB) during interim period
 - Perform cost/benefit analyses to determine program-specific schedules

Benefit: Enables interoperability with NASA and NOAA, frees up spectrum for commercial use



SATOPS Spectrum Overview

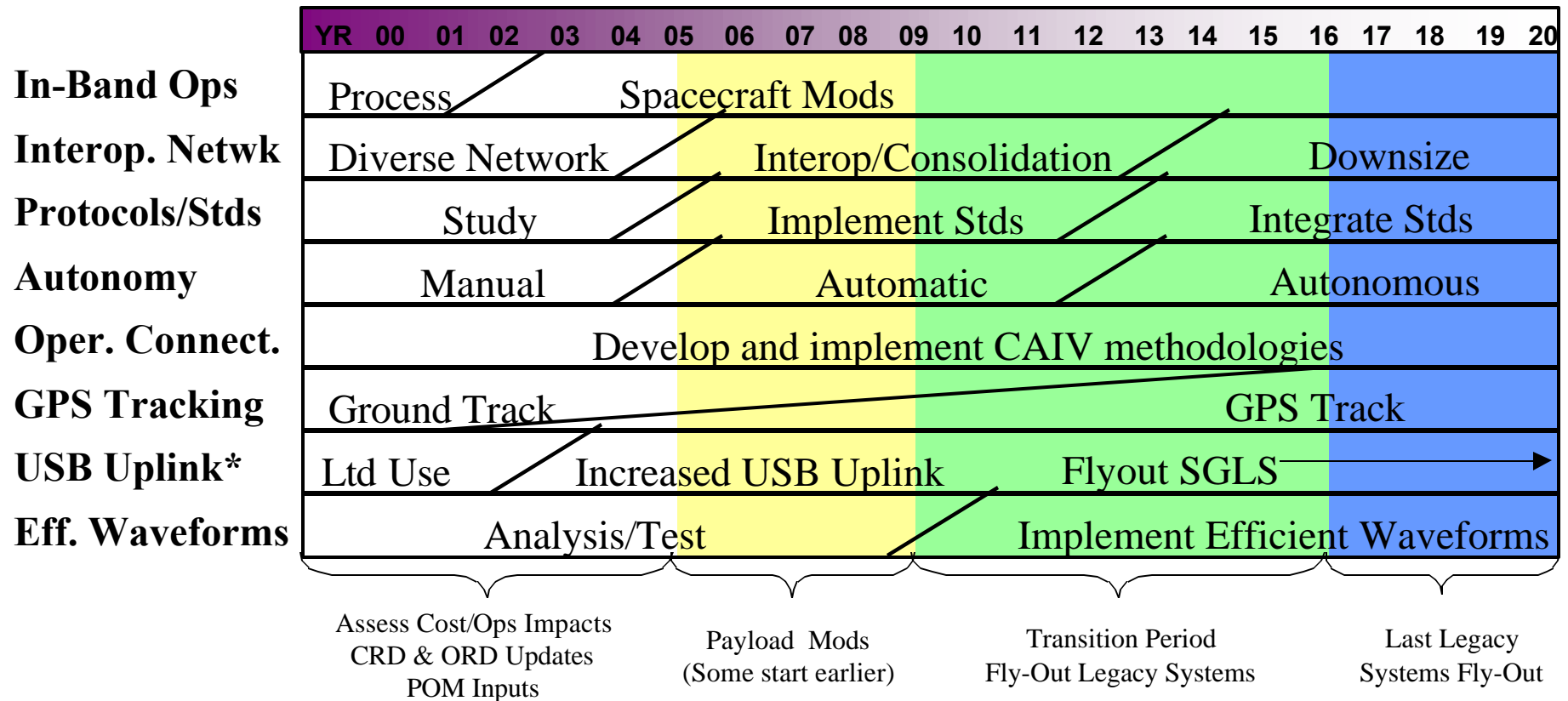


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Implementation Schedule



* SGLS req'd to support legacy satellites until missions are complete. End state by 2025

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