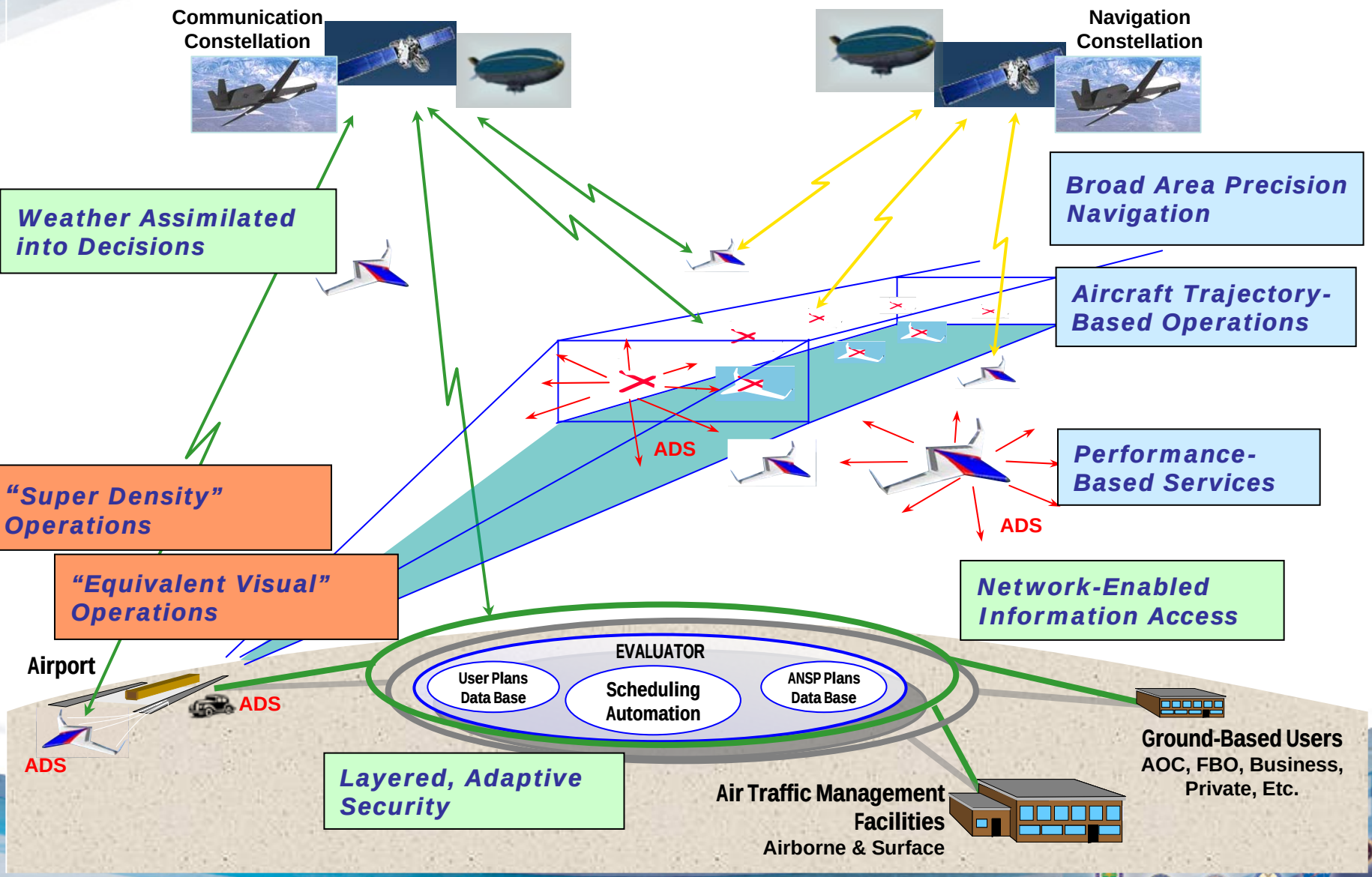
2025 Concept for "Airport Curb-to-Airport Curb"

- System-Wide Transformation
- Network-Enabled Information Access
- Performance-Based Services
- Weather Assimilated into Decisions
- Layered, Adaptive Security
- Broad-Area Precision Navigation
- Aircraft Trajectory-Based Operations
- "Equivalent Visual" Operations
- "Super Density" Operations

NGATS 2025 Major Capabilities

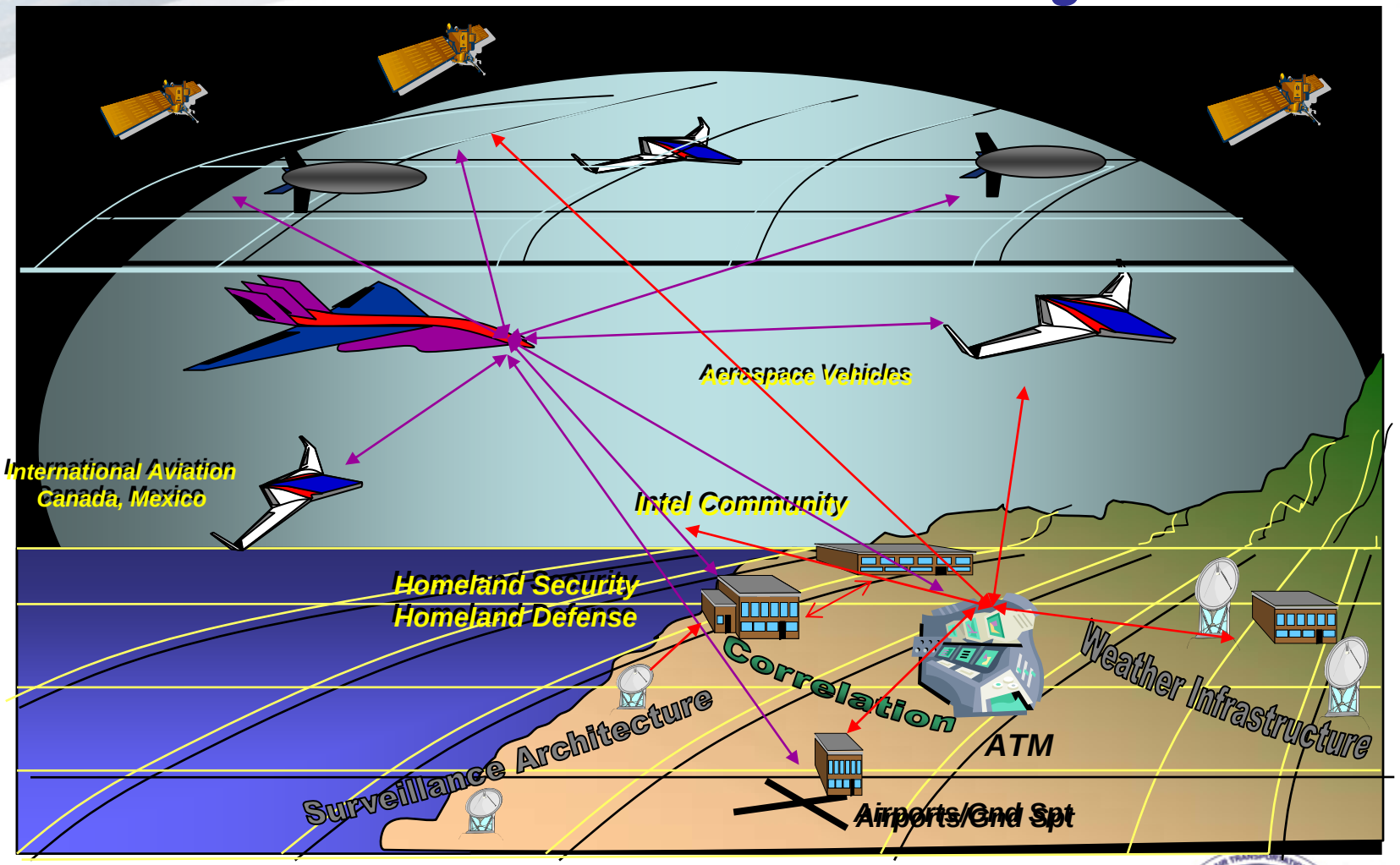


Capability:
Network-Enabled Information Access

Global secure access, information handled according to "communities of interest"

- **"Shared Situation Awareness"**
  - **Real-time free-flow of info from private, commercial, & government sources**
  - **Push / pull processes, secured according to needs and priorities**
  - **Common awareness of day-to-day ops, events, crises**
- **Aircraft are additional "nodes" in network**
- **Integrated surveillance system across government**

NGATS Information Sharing

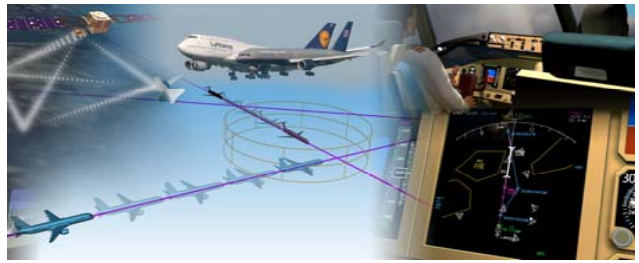


2025 Assumptions

- Sufficient bandwidth exists
- Sufficient infrastructure
- Total Security Integration
- Broad-Area Precision navigation
- Tailored, secured according to needs of users
- "Push/Pull" information sharing via NEO

Capability: Performance-Based Services

Service levels designed to capability performance



- **Multiple service levels aligned with specified user performance thresholds**
  - Provides choice to users depending on needs
  - Required Communication, Navigation and Surveillance performance
  - Other categories of performance -- environment, security, etc
- **Services flexible to varying situations / needs**
  - Varies from area to area, in terms of airspace and "air portal" surfaces
  - Varies with time as needs dictate
  - Preference established based on user capability / equipage / training / security etc.
- **Performance levels used to analyze risks (safety, security, environment, etc)**
- **Service guarantees let users align performance with needs**
  - Developed cooperatively by service providers and their users

Capability: Weather Assimilated into Decisions

Common weather picture across NGATS

- **Fuse multiple weather observations and forecasts into single national database, dynamically update as needed**
  - **1000's of sensors (airborne & ground) feed 10's of forecast models**
- **Learning automation accounts for weather and its uncertainties in managing aircraft trajectories**
- **Identify hazardous weather real-time**
- **Assimilated into NGATS "decision loops"**
  - **Total integration via machine-to-machine**
  - **Critical decision system time scales using both probabilistic and deterministic weather info**
  - **Optimized to maximize available weather-favorable airspace**
  - **Terminal weather impacts including ground/ramp ops**

Capability: Layered, Adaptive Security

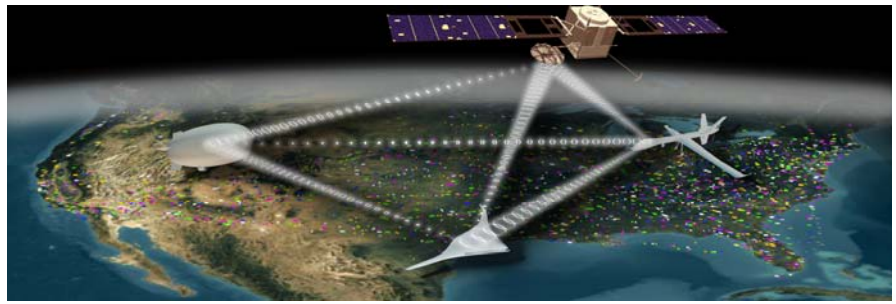
Move people/goods expeditiously from "curb-to-curb" while enhancing security

- **Adaptive Security for People, Cargo, Airports and Aircraft**
- **Risk Assessment-Driven Evaluation and Response**
- **Positive Identification for People and Cargo**
- **Preventive Threat Detection and Mitigation**

Capability: Broad-Area Precision Navigation

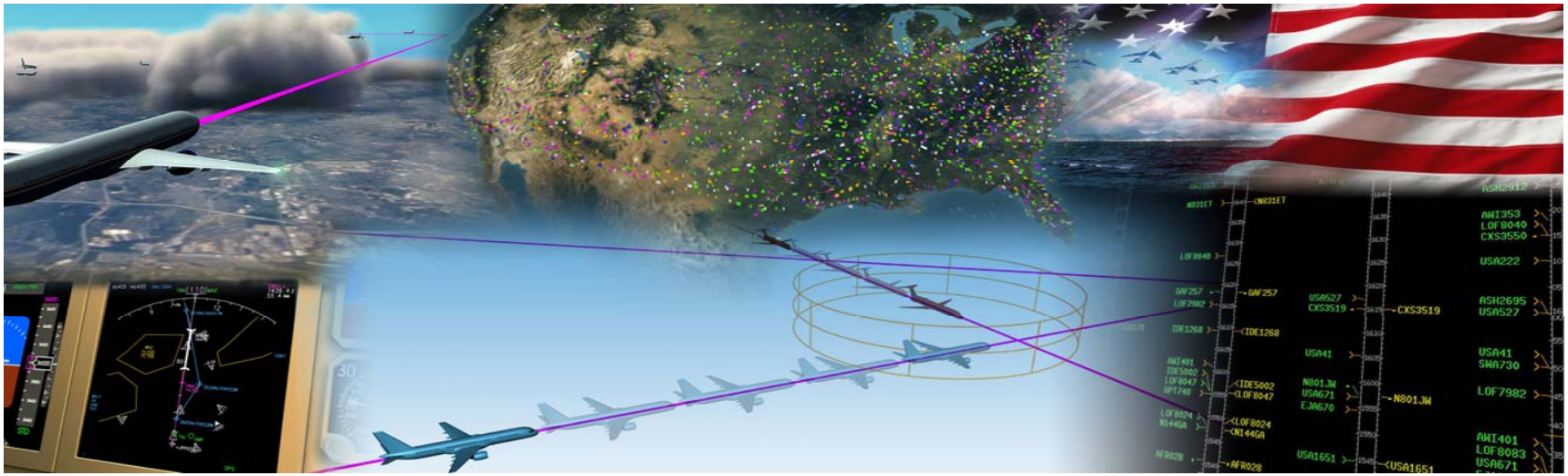
Large area precision enables flexibility

- **Navigation performance sufficient to enable precision approaches (CAT-I / II / III)**
  - Minimal / zero ground-based aids at any "air portal"
  - CAT-II without local augmentation, CAT-III with low-cost local augmentation
  - "Air portal"-specific, vice runway-specific
- **Broad-Area to Global Availability of Nav Services**
  - Meeting appropriate requirements for accuracy, integrity and continuity
- **Reduction / elimination of legacy systems & procedures**



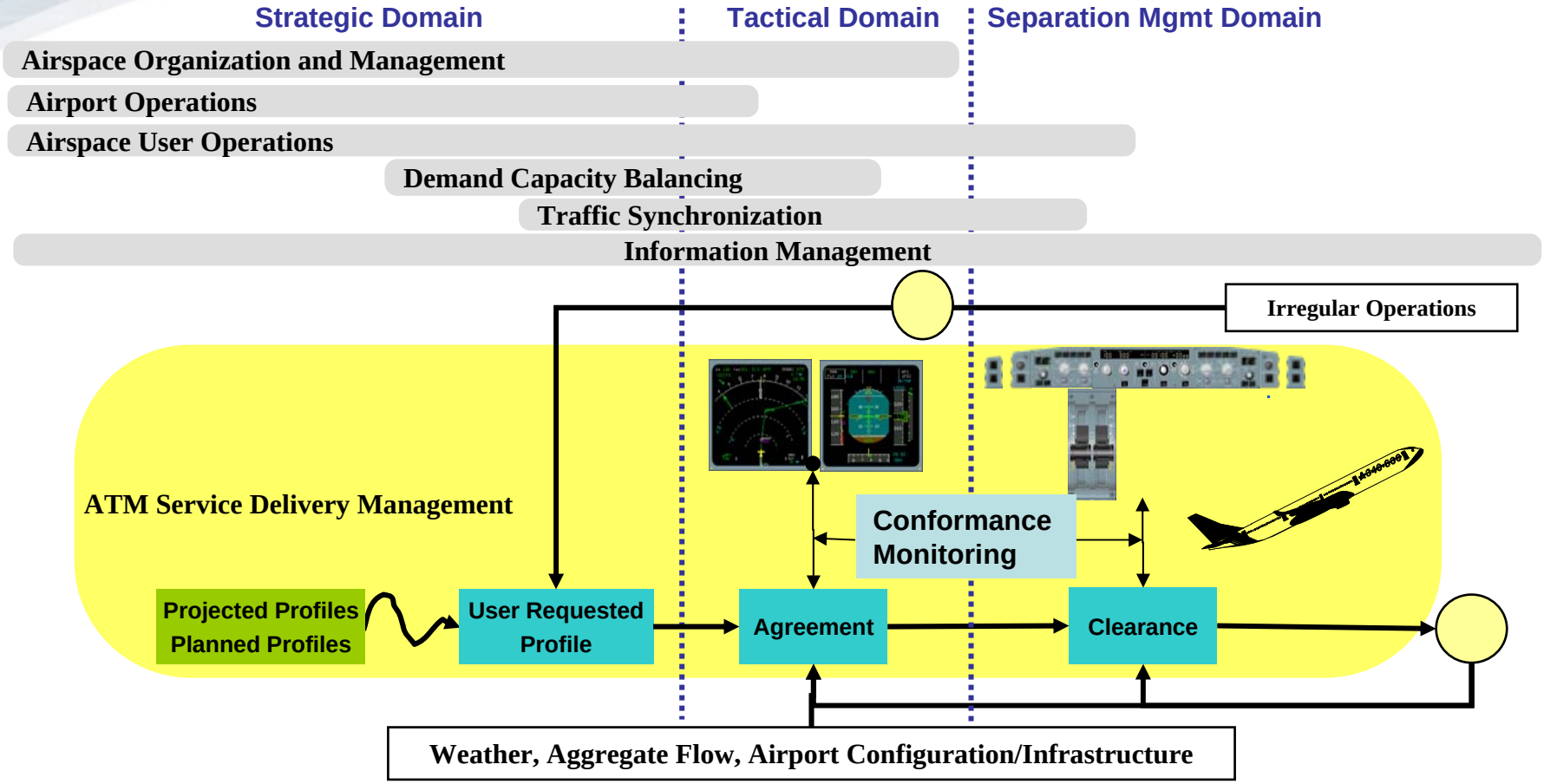
Capability:
Aircraft Trajectory-Based Operations

Adjust airspace configuration to meet user needs



- Airspace configuration driven by: User needs, DoD / DHS requirements, safety, environment, overall efficiency
- 4D trajectories are basis for planning and execution
- Machine-based trajectory analysis and separation assurance
- Users “contract” for airspace access and service
- Airspace reconfigurable during day of operations

Aircraft Trajectory-Based Operations: Management-by-Trajectory



Key Issues are functional allocation between:

- Automation and humans
- Aircraft operators and service provider

Aircraft Trajectory-Based Operations: National Dynamic Airspace

- **Freedom from static geospatial constraints**
- **Allocate airspace as a resource to meet "demand"**
  - **Temporal implementation of high-density, high demand corridors, etc**
  - **Creates options for service provider operations**
- **Single mechanism for implementing Special Use Airspace, TFR's, etc**
  - **Maximizes airspace access to all**
  - **Defense and Homeland Security needs prioritized**

"Evaluator"

- Integrates/communicates weather, security, defense, environmental, safety & other information
- Users "post"/update desired 4D trajectories in common system that continuously evaluates mutual compatibility
- Predicts potential "over demand" situations
- Works across all time horizons from days/weeks/months prior to flight up to separation management (20 minutes or less)
- Supports distributed decision-making environment where players have clear, agreed-to roles and rules of engagement

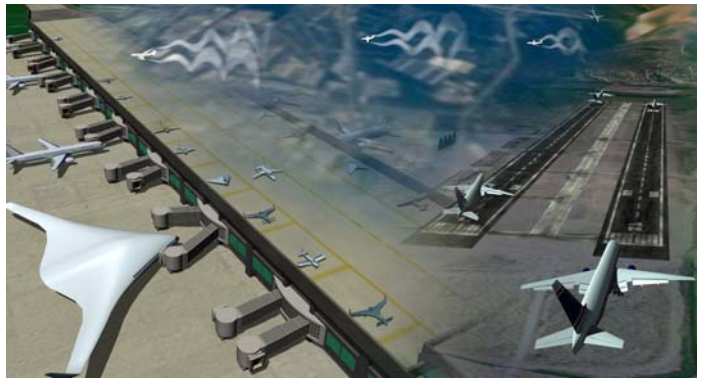
Capability: "Equivalent Visual" Operations

Increasing capacity from today's non-visual conditions

- **Aircraft perform *"equivalent visual"* operations in non-visual conditions (achieve "VFR capacity" under these conditions)**
- **ATM provider delegates *"maintain separation"* responsibility to aircraft operators**
  - **Requires timely, high fidelity information on nearby aircraft, weather, etc**
- **System-wide availability at all "air portals"**
  - **With appropriately capable "landside" (including security)**
- **More predictable operations at busy airports**

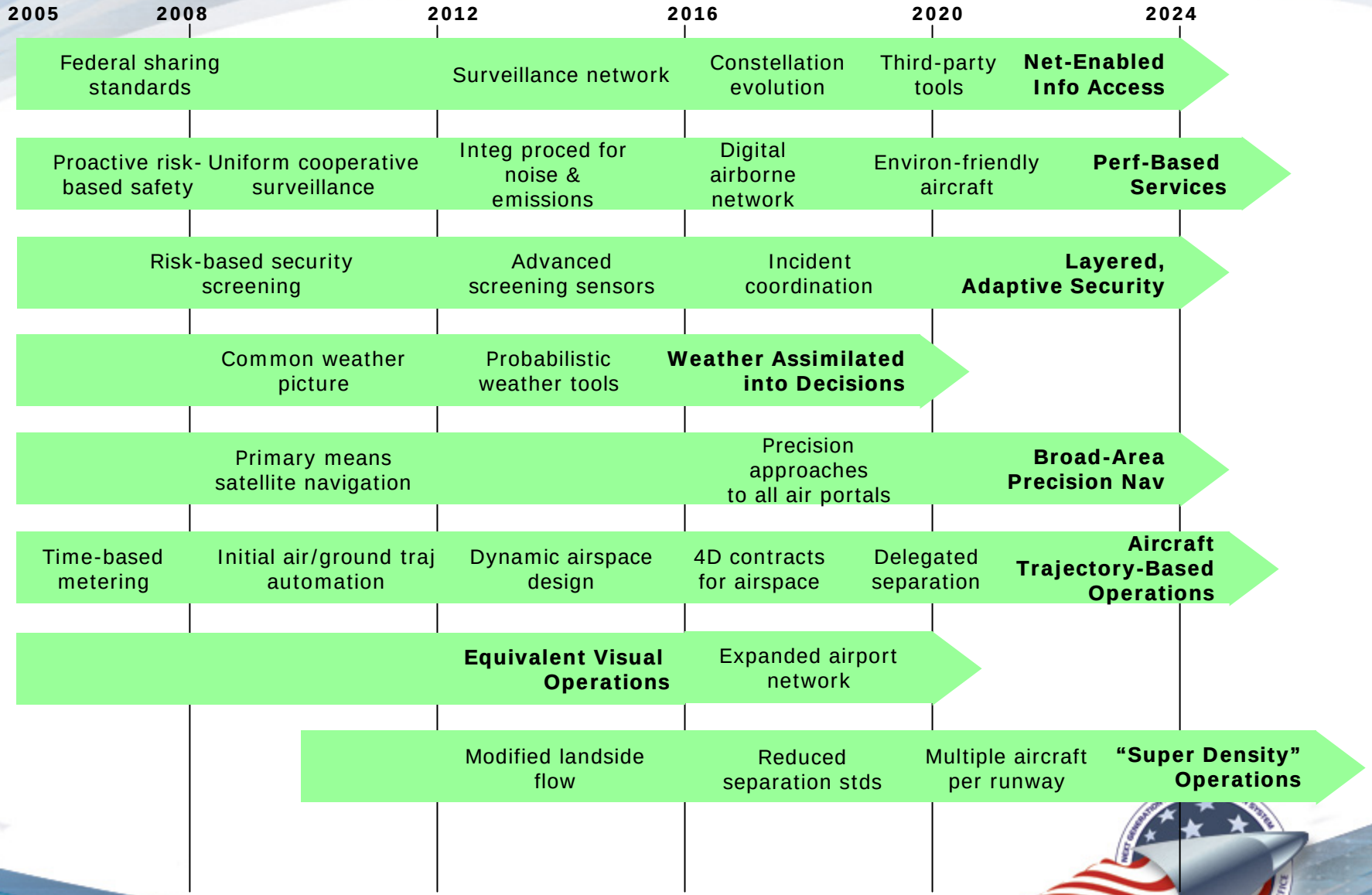
Capability: "Super Density" Operations

Peak performance for the busiest airports



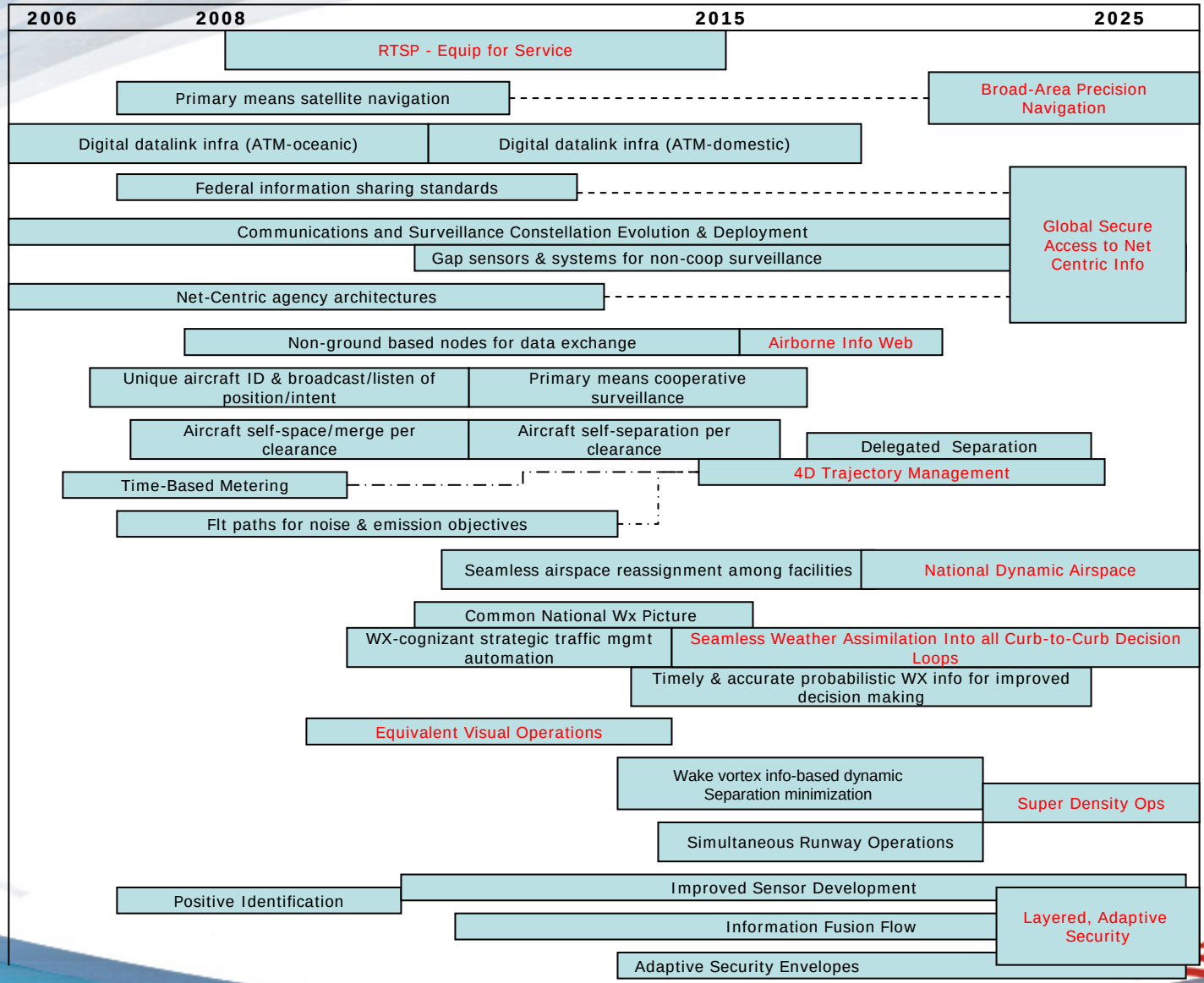
- **Maximized runway capacity**
  - Reduced arrival / departure spacing
  - Equivalent Visual capability
  - Predictable detection / integration of wake vortex hazards
- **Reduce Runway Occupancy Time**
  - Aircraft energy management during rollout coupled with optimum turnoff selection
  - Situational awareness of "nearby" surface traffic and intent for high-speed turnoff
- **Simultaneous operations on single runway**
  - Multiple aircraft operate on a single runway when sufficient "separation" exists
  - High-update rate surveillance info available to all aircraft
- **Airport "landside" (including security) sized accordingly**

Capability Migration Roadmap



BACKUP CHARTS

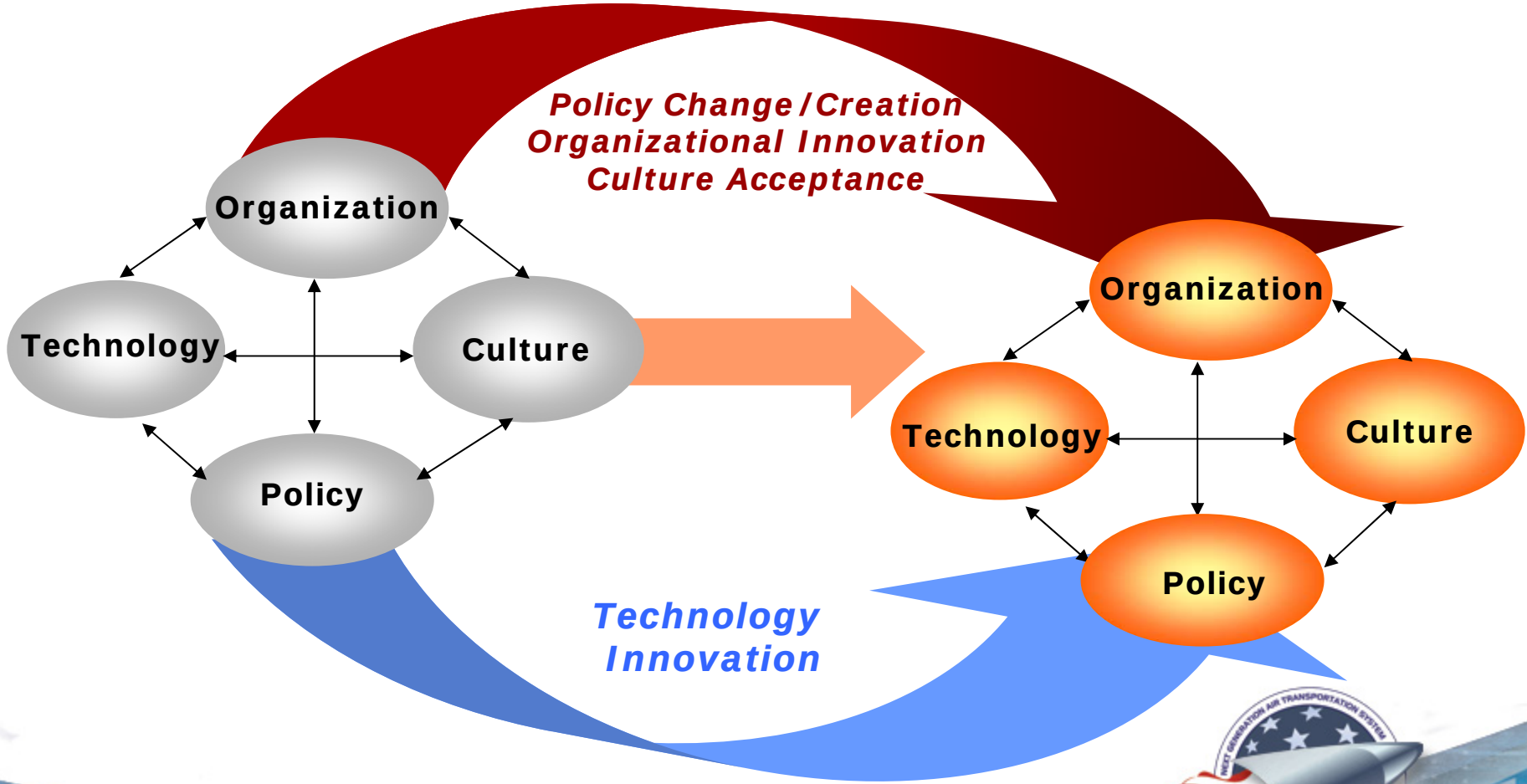
"Curb-to-Curb" Capability Roadmap



NGATS 2025: Initial Needed Activities

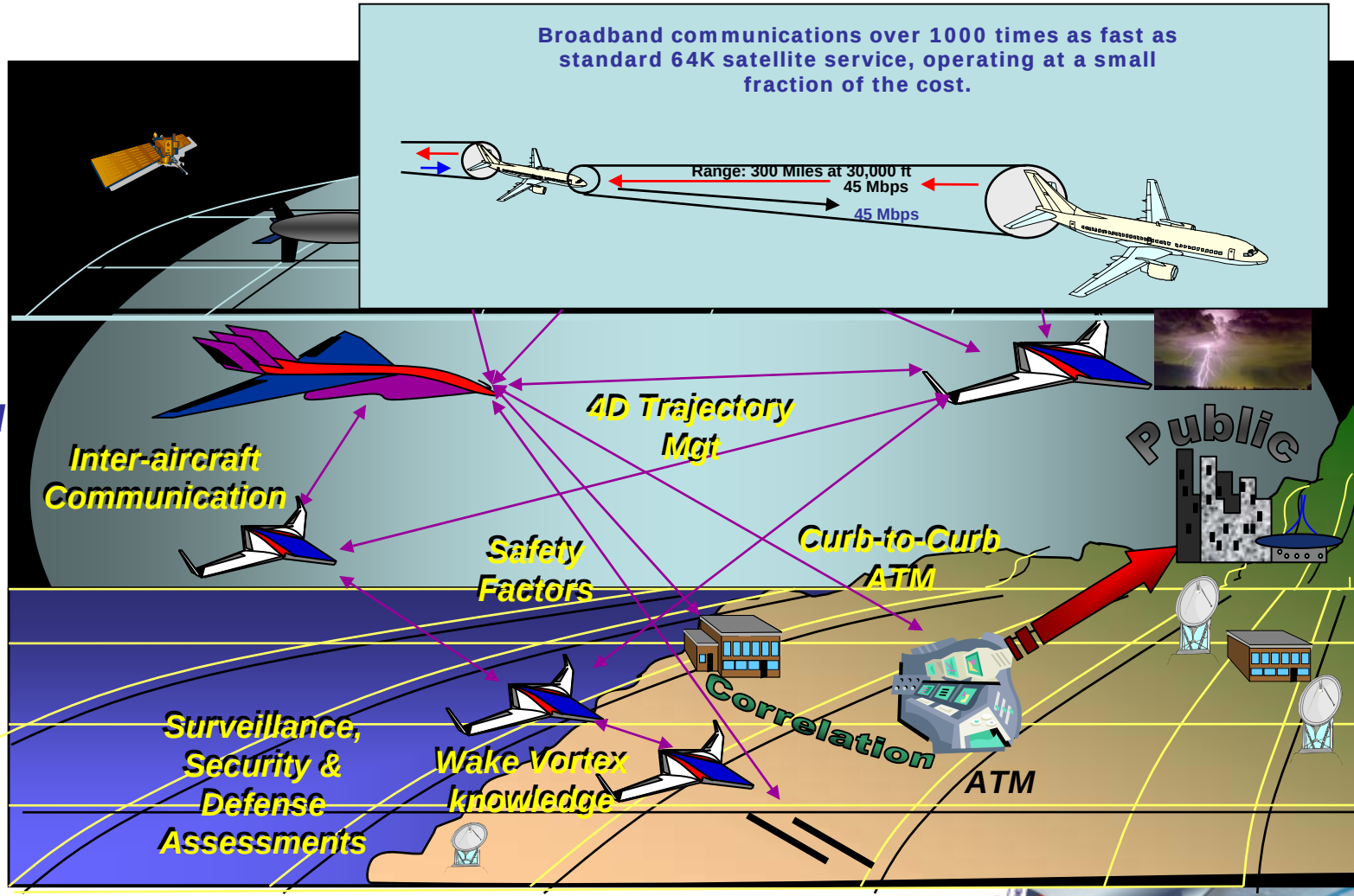
CAPABILITY	Major FY06-07 Activities
Network-Enabled Information Access	• Policy changes and standards adoption • Research technology alternatives, explore COTS • Non-ground based info sharing constellation
Performance-Based Services	• Continue current RNP activities • R&D to complete definition of RTSP, aligned service levels, potential preference framework
Layered, Adaptive Security	• Adaptive Security Envelopes, positive people & cargo ID • Improved threat detection, aircraft & facility hardening
Weather Assimilated Into Decisions	• Modify current weather models to produce common formatted output • Synchronize common weather information network development efforts
Broad-Area Precision Navigation	• Engage GPS JPO around Block III requirements • Research requirements and system alternatives
Aircraft Trajectory-Based Operations	• Modernization activities (Time-Based Metering, ERAM, Common 4D Geospatial Information, Airspace design toolset for ERAM, etc) • Research "design issues" and requirements
"Equivalent Visual" Operations	• Initiate ADS-B implementation • Research leading to Wake Vortex prediction
"Super Density" Operations	• *No major activities required in FY06-07*

System-Wide Transformation
Requires Innovation Across All Lines of Development



Airborne Information Web

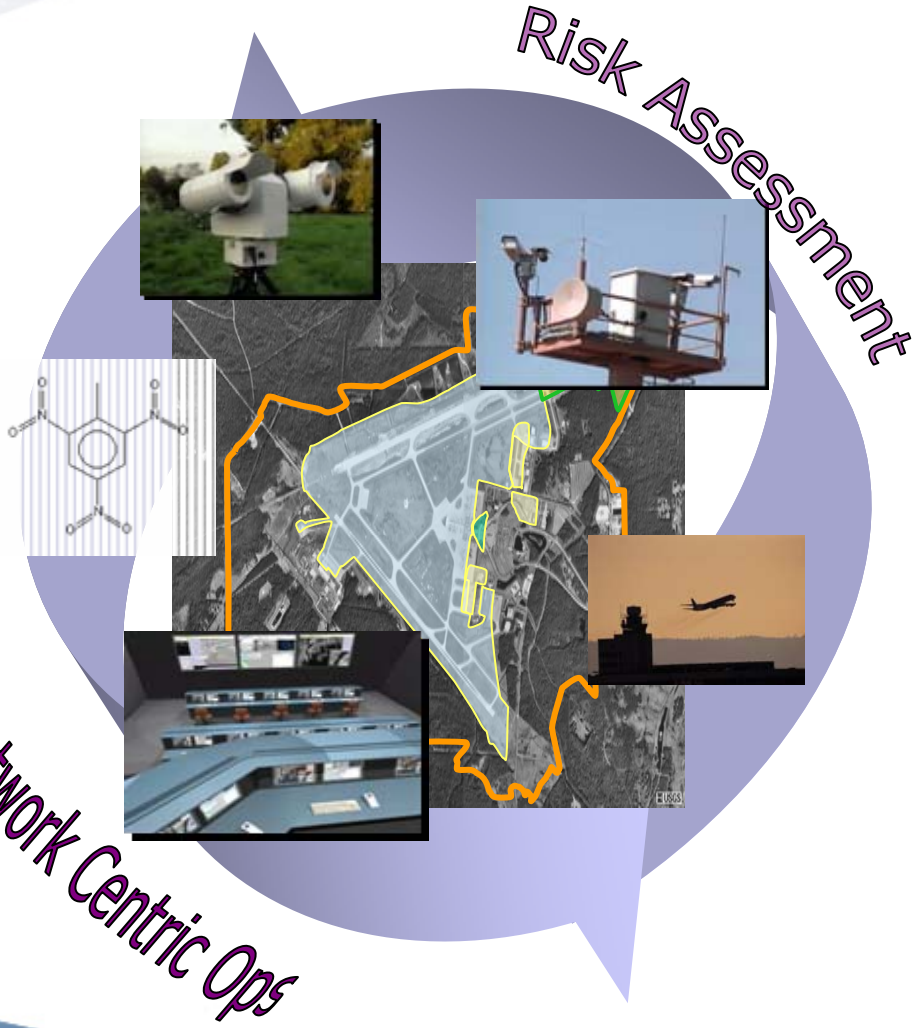
- Broad-area broadband
- Data & Voice
- Surveillance
- Secured
- Responsive
- User-tailored



Layered, Adaptive Security: Secure People and Cargo

- **Adaptive Security Envelopes**
  - Passengers, crew & employees
  - Secure Passenger Programs
  - Known and Unknown Shipper Processes
- **Positive Identification**
  - Check Points
  - Credentialing
  - Cargo Integrity
- **Detect Threats**
  - No-Impact Screening
  - Checked Bags
  - Cargo Screening

Layered, Adaptive Security: Secure Airports & Aircraft



- **Facility Hardening**
  - Airport Access
  - Facility Surveillance
  - Perimeter Awareness
  - Airport Design
- **Aircraft Hardening**
  - Internal and External
  - Cabin / Cargo Chem / Bio, Rad / Nuc Sensors
  - Cabin / Cargo Surveillance
- **Mitigate Effects**
  - USNORTHCOM
  - Trained Cabin Attendants
  - Federal Air Marshals
  - Federal Flight Deck Officers
  - MANPAD Mitigation

Net-Centric Operations

"It's about the Users"

From

- Info supplier dominated
- Owner pushes controlled info
- Sequential info flow

Gather, Process, Use, Disseminate

To

- User (consumer) dominates
- Owner posts info for appropriate classes of users
- Parallel information flow

Gather, Post, Process, Use

Net Centricity Payoffs

- Faster Decision Making
- Increased Collaboration
- Better Decisions based on access to more information