Turning Architectures into Capabilities

National Security Space Policy and Architecture Symposium

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As usual, I worked until midnight last night, mom.

Well, at least you made some extra money.

I don't get paid for overtime.

Well, at least it was important work.

Not really.

My boss made me change my "PowerPoint" slides, but the changes make them worse.

Well, at least you're prepared for your meeting.

It was canceled.

But that's okay, because the project isn't funded anyway.

So... you worked for free to worsen a presentation for a meeting that won't happen for a project that doesn't exist?

Yup.

Oh... you must be an architect!
National Security Space Office (NSSO) Background

• NSSO primary roles:
  – Staff Support to DoD Executive Agent for Space
  – NSS Architect (NSSA)

• NSSA established by 1998 MOU for NSS Management between SecDef (Cohen) and DCI (Tenet)
  – “Ensure activities are closely coordinated and architectures are integrated to maximum…”

• Support Decision-making
Architectures: What they are and aren’t

- Provide framework and context
  - Much like city planning
  - Versus designing a specific building

- Recommendations that guide long term actions
  - Focus on ultimate destination
  - Versus the next exit & meal stops or what’s within range of the headlights

- Characteristics or objectives that influence decisions
  - Allows flexibility in moving towards objective
  - Versus specific system implementations

If all we want to do is go east, we don’t need a roadmap

However if we have a preference for destination, then...

Small adjustments at each intersection have a big impact at journey’s end
Architectures: What makes them successful

• Context
  – End to end mission, all platforms
  – Interfaces with other missions and mediums

• Dynamic
  – Continuous assessment to address “facts of life”

• “Enforceable”
  – Enough detail to support implementable decisions

• Transparent
  – Impartial build of “should be” architecture

• Senior leadership participation
  – Agreed evaluation criteria
  – Organizational data sharing
SATCOM Architecture
TCA Version 2.0

User Terminal Segment
Terrestrial Infrastructure Segment (Backbone & User Networks)

IC: HSN, ...
DoD: GIG-BE; DSN CONUS/OCONUS, ...
NASA: NASA-Net, ...

Network Management: Integrated Network Management: operations (OMCs), networks (NOCs), satellites (SOCs), launch & anomaly (CCS-C)

LEGEND
- RF Links
- Optical Links
- Terrestrial Links
- Circuits
- IP (Packets)

MILSATCOM (Systems of record)
- Protected (TSAT, AEHF, EPS)
- Wideband (WGS)
- Narrowband (MUOS)
- Commercial

Deployed Networks:
- LandWarNet
- FORCEnet
- AF C2 Net
- ...
PNT User Perspectives (2025)

<table>
<thead>
<tr>
<th>User Group Size</th>
<th>User Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huge (10M+)</td>
<td>Many (100K+)</td>
</tr>
<tr>
<td>Large (1M+)</td>
<td>Some (1000+)</td>
</tr>
<tr>
<td>Many (100K+)</td>
<td>Few/None</td>
</tr>
</tbody>
</table>

* = Color accounts, to some extent, for indirect users

<table>
<thead>
<tr>
<th>Position</th>
<th>Navigation</th>
<th>Orientation</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location Based Services</td>
<td>Tracking</td>
<td>Survey</td>
<td>Scientific</td>
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<tr>
<td>Scientific</td>
<td>Recreation</td>
<td>Transportation</td>
<td>Machine Control</td>
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<tr>
<td>Transportation</td>
<td>Agriculture</td>
<td>Weapons</td>
<td>Orientation</td>
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<tr>
<td>Orientation</td>
<td>Comm &amp; Timing</td>
<td>Satcom</td>
<td>PGMs Radios Handhelds</td>
</tr>
<tr>
<td>Time</td>
<td>Cell Phones &amp; PCs</td>
<td>Satcom</td>
<td>Boats and Rail</td>
</tr>
</tbody>
</table>

**部門**
- Commercial Civil
- Homeland Security
- Military

**脳**
- Space
- Air
- Surface
- Sub-surface

**機能**
- ISR
- Satellite
- Wx Balloons
- PDAs
- Autos
- PGMs
- Compasses
- JBFSA
- Scuba
- Radios

**用途**
- Agriculture
- Transportation
- Machine Control
- Orientation
- Time
PNT Architecture Trade Axes

• **Source Location** (of the service provider)
  - Terrestrial: concept provides service from, near, or beneath the surface of the earth
  - Space: concept provides service from space

• **Service Volume** (of the service provided)
  - Local: concept provides a meaningful service only at a fixed point
  - Interplanetary: concept provides a meaningful service throughout the solar system

• **Autonomy** (of the user)
  - Dependent: concept requires frequent refresh of information from external sources to provide a meaningful service
  - Autonomous: concept, once initialized, is self-contained; requires no refresh of info from external sources to provide meaningful service
Assuring access to Space for US & Allied Forces
Denying access to our Adversaries
- Vision and planning across the community is needed to maintain US preeminence

- Build the bridge from both sides

It’s time to stop acting “systems” and start acting architectures