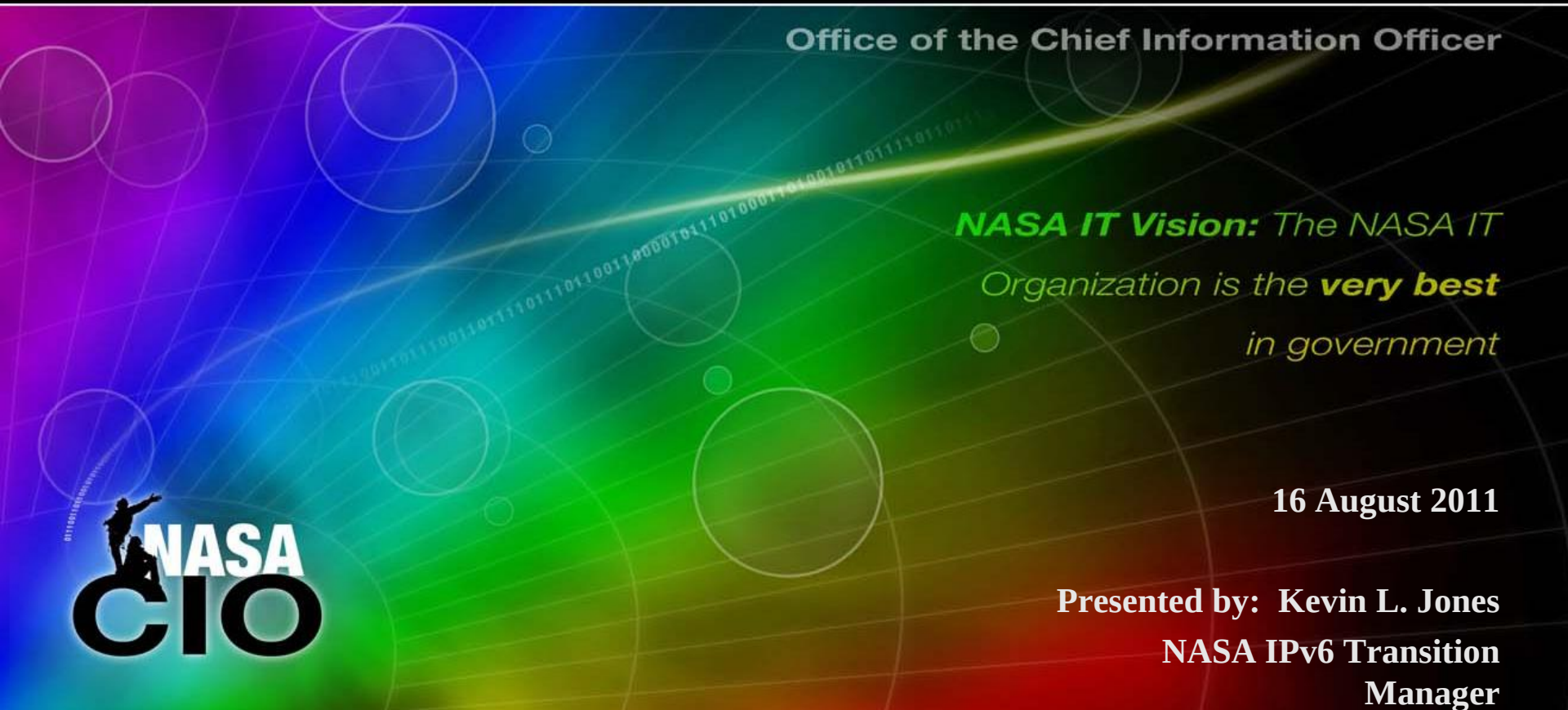
National Aeronautics and Space Administration

NASA IPv6 Deployment Status
DREN IPv6 Summit



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NASA IPv6 Transition Manager

Overall IPv6 Status

- NASA IPv6 effort is underway, but still in the early stages of implementation
- Cooperated in the 2008 IPv6 demonstration of capabilities but not much was done afterwards for various reasons
  - » Person leading IPv6 effort left the agency
  - » Some were in denial that IPv6 was a priority
    - "We have plenty of IPv4 address space"
  - » Unfunded mandate in some sense was not extended until September 2010
- With what might be considered good timing, NASA IT leadership is supportive of the implementation of IPv6
  - » September 2010 - OMB Memo
  - » February 2011 - Depletion of IPv4 address space
  - » June 8, 2011 - World IPv6 Day

IPv6 Outreach

- After being appointed as the NASA IPv6 manager for NASA presentations were given to two NASA IT boards:
  - » Network Architecture Board (NAB) which consists of at least one networking lead from each NASA center and some IT groups
  - » Information Technology Management Board (ITMB) – consist of the center and mission directorate CIOs
- With the support of the ITMB and NAB the NASA IPv6 Taskforce was established
  - » The taskforce has five technical sub teams
  - » Routing, DNS, Security, Test & Verification, and Web & Applications

IPv6 Communication Tools

- Conference Calls
  - » NASA IPv6 Taskforce meets bi-weekly
  - » NASA Technical Sub Teams meet weekly, bi-weekly or as needed
- Distribution lists for NASA taskforce and sub teams
- NASA IPv6 taskforce sharepoint site
- Internal IPv6 website is in development for the entire agency to capture notices, policies, updates, etc.
- Fedv6 Meetings
  - » Fedv6 Working Group meets monthly
  - » Fedv6 Sub Teams meet as needed

IPv6 Budget

- IPv6 is an unfunded mandate, and therefore there is no specified is budget for this activity
- Therefore, the current NASA approach is that each IT project will have to absorb their IPv6 implementation cost within their program and/or project. As Ron says, “Everyone must do there part!”
- One of the OMB milestones requires the exhibit 300 investment submissions incorporate language about how they will implement IPv6
- IPv6 implementation is a coordination activity
- Real urgency to insure IPv6 is incorporated into all technology refresh activities

IPv6 Procurement Compliance

- FAR language from November 2009 requires agencies to comply with IPv6 compliant IT purchases
  - » Utilizing the USGv6 profile is non-trivial
  - » There is a learning curve for making Standards Declaration of Conformance (SDOC) being part of the standard IT purchase process
- Approach underway is to establish a NASA Interim Technology Requirement (NITR) that will come from the agency CIO to the entire agency via the center CIOs
  - » Gets the word out to the entire agency
  - » Policy will eventually replaced by a more formal Communications Policy Document

IPv6 Procurement Compliance

- Development of a NASA sub team to focus on this area has been a goal for some time now
  - » Most policy people believe the FAR language should be sufficient
  - » Procurement folks are already overloaded so while supportive they are adverse to taking on new work responsibilities
- Very interested in the efforts that will come out of the Fedv6 IT Management Sub Team
- Some agencies seem to have made progress in this area (e.g. Commerce, DoE), need to follow-up to see what they have specifically implemented and how

IPv6 Address Allocation

- Currently only two networks in NASA have IPv6 running
  - » NASA Research & Engineering Network (NREN)
  - » The LAN for the NASA Advanced Supercomputing (NASLAN)
- NASA is in the process of completing an IPv6 Guidelines document which will capture
  - » Allocation of IPv6 address space by region
  - » Process for obtaining IPv6 address space
  - » Each center, program, project, etc. will be expected to submit address plans to the NASA IP Address Management (IPAM) project to obtain IPv6 address space

IPv6 Security

- During World IPv6 Day events, discovered that our IDS vendor had not properly implemented IPv6
  - » Vendor is still working on getting fixes implemented
  - » Getting requirements to security vendors
  - » Major concern for going forward with IPv6 implementations
- Notice to the system security plan owners & security community of IPv6 effort
- In process of developing a guidelines document with best practices from the agency network WAN infrastructure group

Next Steps

- Continue to get the word out to the rest of the agency
  - » NITR, internal IPv6 website, Notice to the Security Community, Security Guidelines document
- Center Readiness Assessment
  - » Notification of the IPv6 effort
  - » Data call to establish the readiness of center network infrastructure to turn of IPv6
- Organizing the list of public/external facing servers and services that need to be implemented with IPv6
  - » Consolidation of the list
  - » Grouping by center would enable progress tracking via CIO registry tool

Next Steps

- Utilizing Ames Project Management Office support
  - » Requirements Review
  - » Development of an IPv6 Implementation Plan
    - Updated ACT-IAC Roadmap that is due to be completed in September
    - Requirements Review
    - Transition Plan
- Developing NASA IPv6 Checklist
  - » Infrastructure
  - » Website & Applications
- Developing IPv6 Testplans and testing best practices

Contact Information

- NASA IPv6 Taskforce Sharepoint Site:
  - » https://share.nasa.gov/teams/arc/ipv6-taskforce/default.aspx
- NASA IPv6 Distribution Lists:
  - » ipv6-taskforce@lists.nasa.gov
  - » ipv6-routing-subteam@lists.nasa.gov
  - » ipv6-dns@lists.nasa.gov
  - » ipv6-security@lists.nasa.gov
  - » ipv6-tv@lists.nasa.gov
  - » ipv6-web-apps@lists.nasa.gov
- Federal IPv6 Taskforce Distribution Lists
  - » v6task-force@nist.gov
  - » fedv6-deploy@nist.gov
- NASA IPv6 Transition Manager
  - » Kevin.L.Jones@nasa.gov

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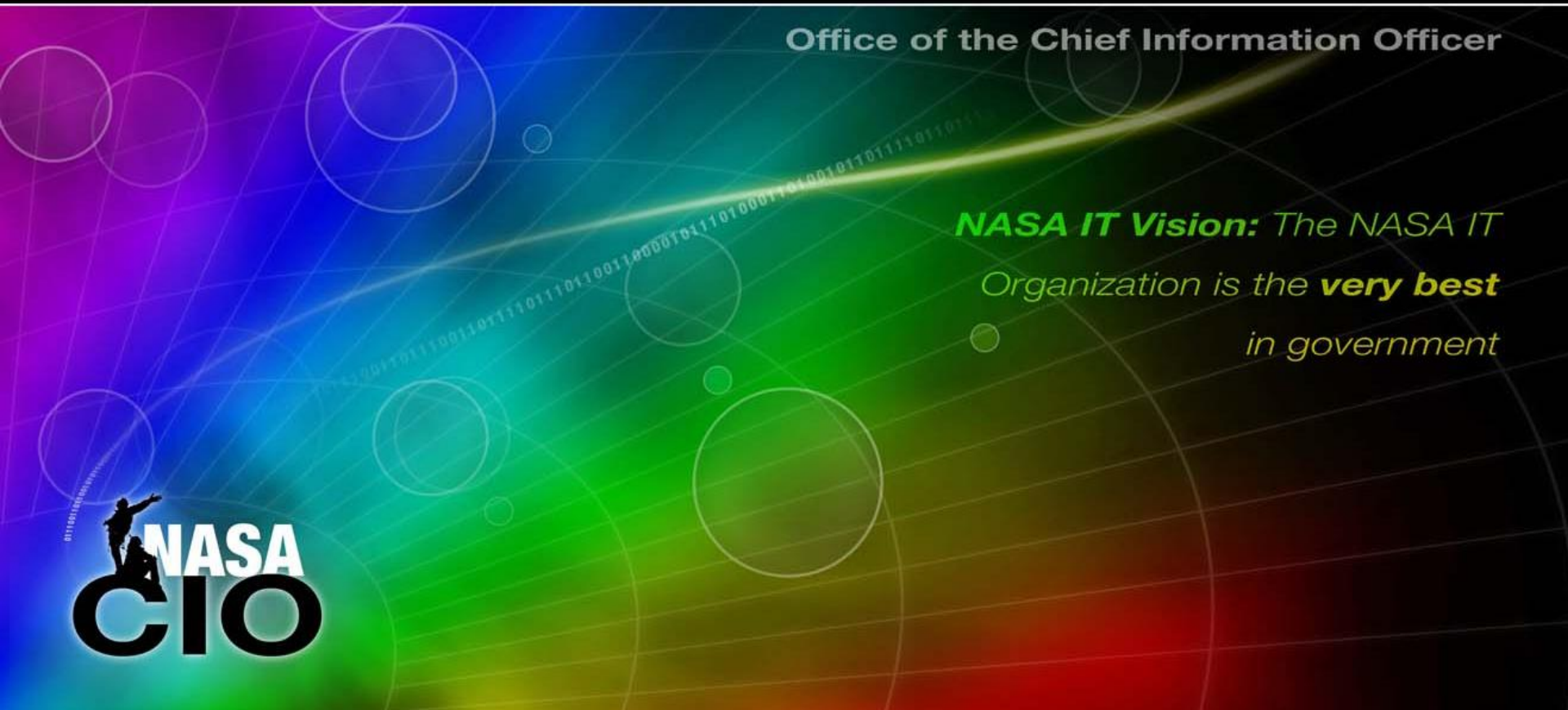
Backup Slides



The Good – Things worked!

- Operating systems (Linux/Unix, Mac OS X, Windows), web servers (e.g. Apache) clients (Firefox, Safari, IE)
- Most dual stack IPv4/IPv6 host client and server applications including ssh, scp, Kerberized telnet and rcp (although Kerberos itself was only using IPv4), and http/https client and server
- IPAM and DNS (both forward AAAA and reverse PTR records)
- Global IPv6 routing exchange and packet forwarding verified to a number of sites
- ping6 and traceroute6 IPv6 network diagnostic tools performed analogously to their ping and traceroute IPv4 tools
- 10-GigE IPv6 network performance between GSFC and ARC using our automated nuttperf/nuttcp network performance measurement capability was demonstrated to be very comparable to the equivalent IPv4 network performance tests

The Bad – Things to watch out for…

- Some sites did not make IPv6 DNS available via IPv6 (making pure IPv6 p
  was zero impact to IPv4 users that it caused a few unnecessary issues for IPv6
- In
  ro d can't run IPv6-only.
- N
  co
- Li
  ro
- N es, si
- Firewalls will probably need to replicate IPv4 rulesets with equivalent IPv6 ru
  required effort to support simultaneous IPv4/IPv6 access restrictions

No single transition day for IPv4 to IPv6

Some apps & tools still require IPv4 only

Need creative approaches for troubleshooting IPv6

ISPs are in the process of upgrading IPv6 by 2012 too

Network monitoring needs to support IPv6

Dual-stack requires security for both IPv4 & IPv6

The Ugly – Warning: Lots of work ahead…

- Policy development is behind the technology development, and some p
- Security is behind the other aspects of IPv6. Many IDS systems handle IPv6 p
security will have to play catch-up in order to meet mandated deadlines.
- If no IPv6 route exists to some service such as a web server, the system automatically drops back to an IPv4 connection, but if an IPv6 route exists (e
timeout before switching to IPv4.
- Postponing the implementing IPv6 is no longer an option. It is critical to "b

Need to update both policies & equipment

Need communicate IPv6 security reqs. to vendors early

Growing pains in this transition are inevitable

Now is the time!