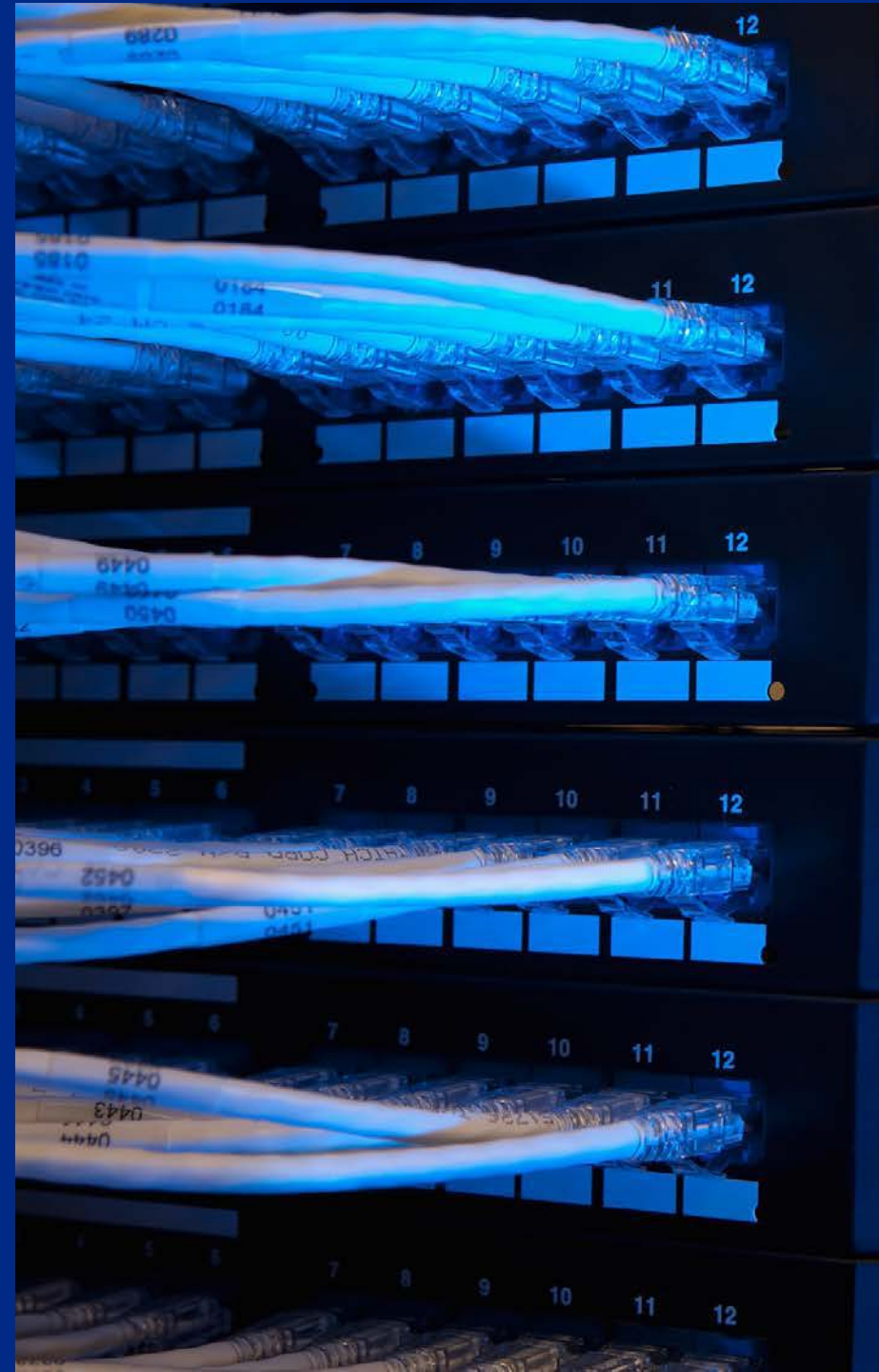


How to upgrade a giant to IPv6

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My starting point in 2021

SAP had been early adaptor of IPv6:

- IPv6 support in on-prem ABAP since 2004
- Most other on-prem software also had some IPv6 support
- No large IPv6 adoption by customer base ☹️
- Only a few IPv6 islands & testbeds left in corporate IT

No IPv6 in Cloud business and acquisition:

- Inhomogeneous infrastructure
- No strong customer demand for IPv6

Growing concern about IPv4 address space depletion

- 9000+ Kubernetes using the same RFC1918 prefix



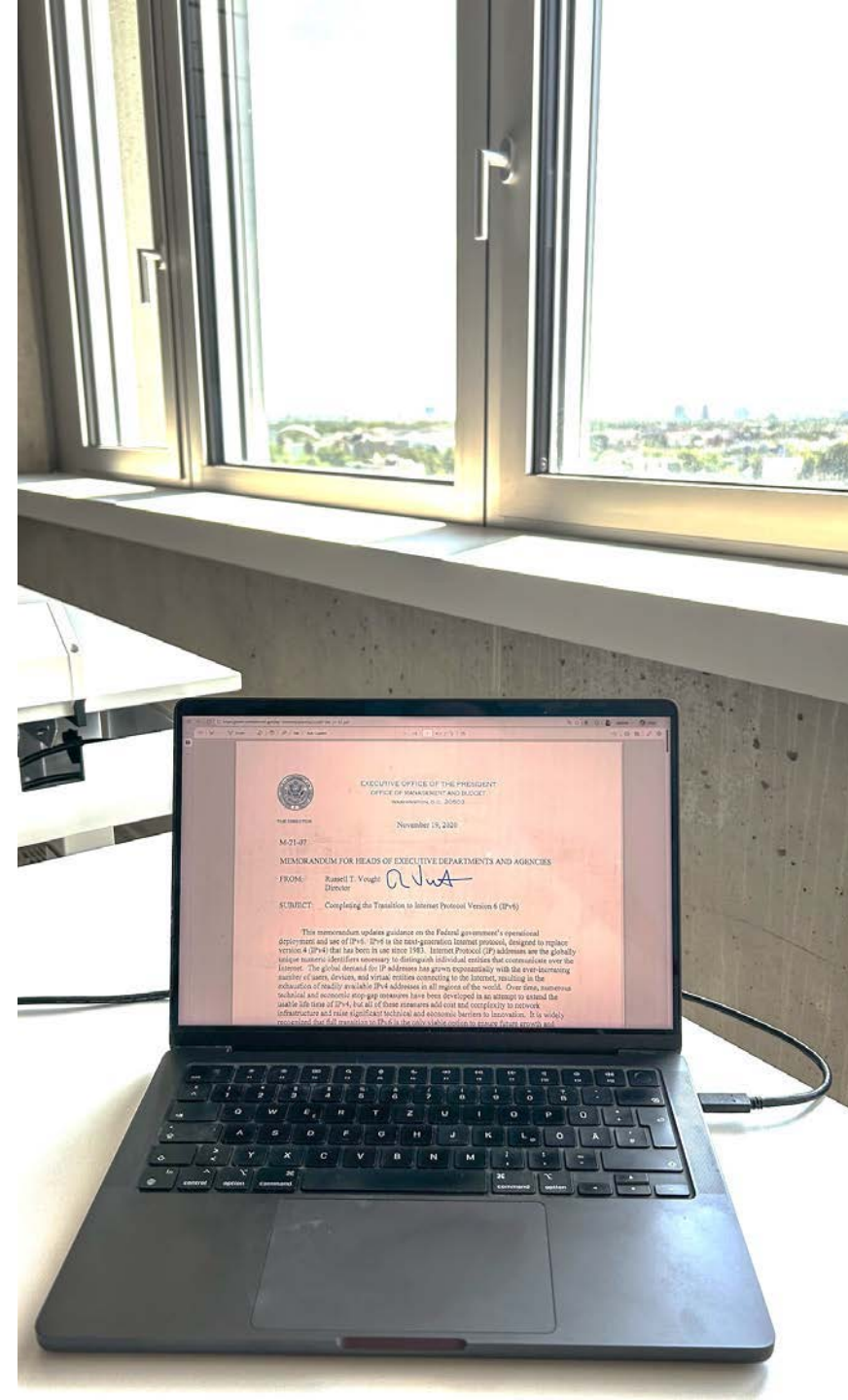
Multi-Cloud Strategy

- For many products, customer can choose amongst cloud infrastructure providers
- Business Suite, BTP, and HANA Cloud available on
 - SAP Cloud Infrastructure
 - AWS
 - GCP
 - Azure
 - Alibaba Cloud
- Diverse offerings on other IaaS partners (IBM, HP, ...)
- Sovereign Cloud infrastructure based on national hardened & certified infrastructure providers



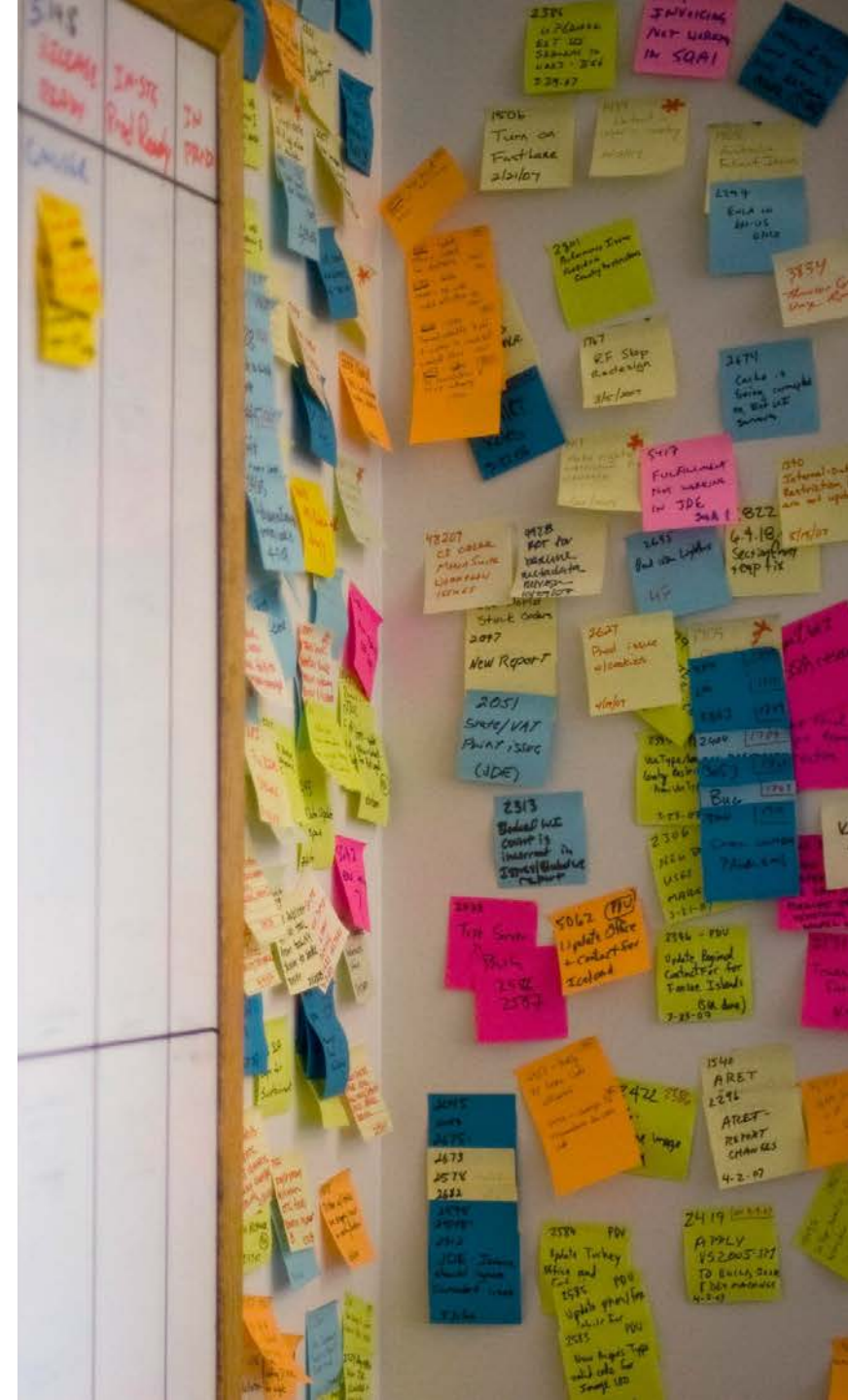
Motivation: US IPv6-only mandate OMB M-21-07

- Strong expression of demand for IPv6
 - US government as a very large customer effected
 - Clear deadline: Oct. 2025
 - Effects > 200 products delivered
- Large enough risk to catch top management attention



Issues with US IPv6-only mandate OMB M-21-07

- Requires actions & decisions from people from many parties that usually don't care too much about network protocols
- It's not a regulation directly affecting businesses
- Works indirectly through Federal Acquisition Rules
- Does not fit corporate compliance processes
- NIST IPv6 Profiles (SP 500-267A) are rather a *blueprint for invitation of tenders* than a *standard*
- Technical requirements hard to match to Software as a Service
- Key question: at which vantage point is IPv6 required?



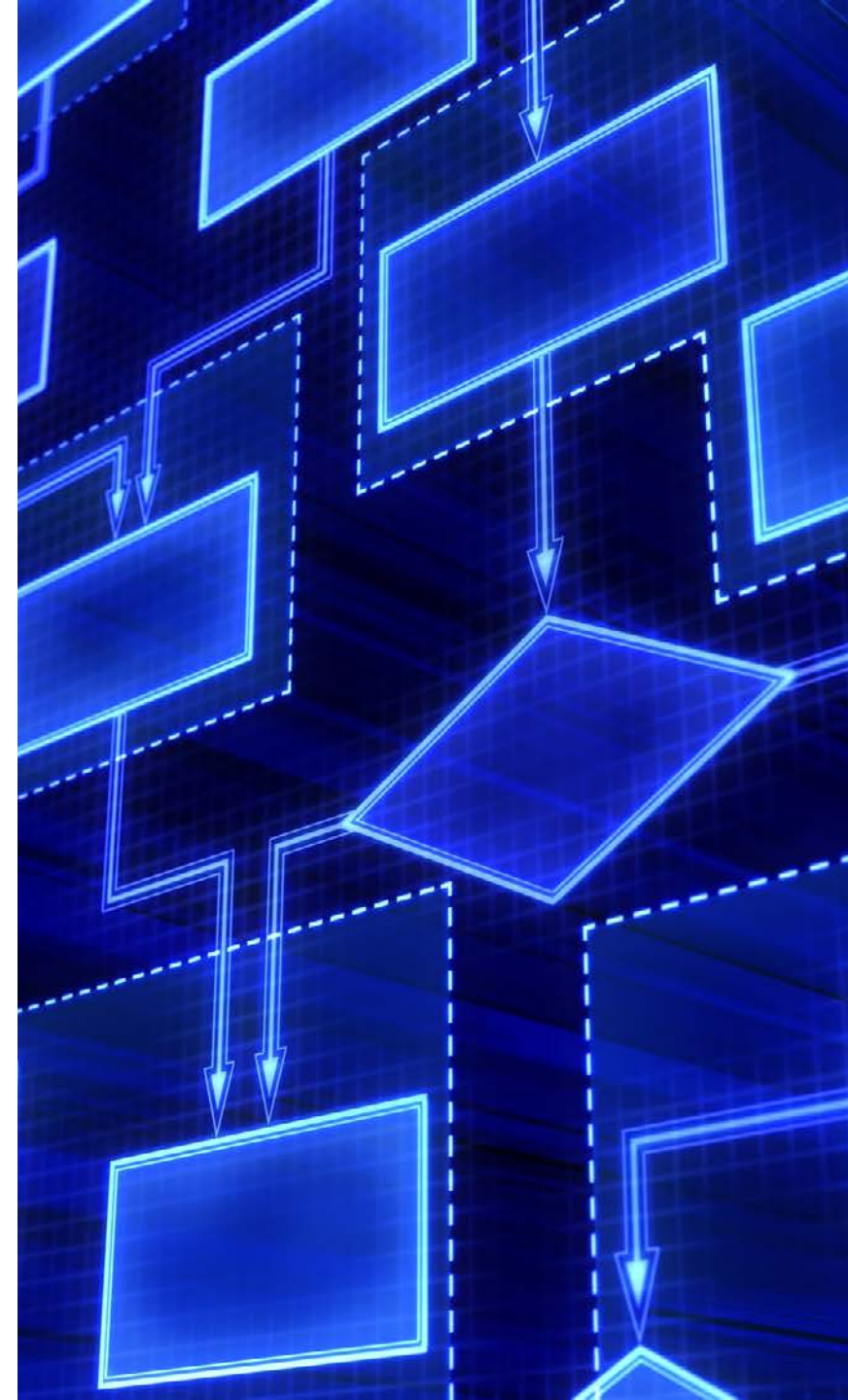
Defining an internal Product Standard for IPv6

The whole SAP product portfolio supports IPv6 without functional regressions, irrespective of whether the customer environment is IPv4-only, dual-stack (IPv4 + IPv6), or IPv6-only:

- *Customers can access all SaaS applications.*
- *Integrations work seamlessly with any customer endpoint.*
- *On-premise products work in any IP-based network environment.*

Before we can test the actual products...

- Developers need IPv6 based network access in offices
- Development & Test landscapes need IPv6 support
 - Fold IPv6 enablement into ongoing upgrade projects
 - No opposition from infrastructure teams
- Cloud Infrastructure & abstractions needs IPv6 supports
- Diverse runtime environments need IPv6 support
 - Kubernetes (Kyma / Gardner)
 - Cloud Foundry
 - BTP ABAP environment
- Drive IPv6 enablement and fixes in Open-Source components



Lessons Learned

IPv6 is mature across most language runtimes

- There are surprising gaps, especially in documentation
- There are surprising defaults, e.g., Java preferring IPv4 over IPv6
- State of happy eyeballs varies heavily

→ Most code just worked once infrastructure was ready

→ Testing Best Practices: [draft-ietf-v6ops-ipv6-app-testing](#)

IPv6 support of cloud infrastructures differs heavily

- Needs extra time for gaps in 3rd party infrastructure
- Increases effort for infrastructure portability

Fixing IPv6 issues in Open-Source is key

- Kubernetes ecosystem has surprisingly many gaps
- Upstreaming is usually a greater challenge than developing





**Getting IPv6 ready
is not a technical
problem but an organizational challenge...**

Where are we today?

- We delivered IPv6 to our US federal gov. customers.
- We have frontrunner cloud products live with IPv6
 - SAP Concur
 - SAP BTP Connectivity & Destination Service*°... and had no major issues during go-live
- We offer IPv6 as optional feature for SAP Business Suite (RISE)*
- We added optional Happy Eyeballs support to ABAP
- We are currently working on the IPv6 enablement for SAP BTP & HANA Cloud public cloud customers*

* on AWS / ° on GCP based landscapes



Thank you!

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