

# IMPERIAL

## IPv6-Mostly at Imperial

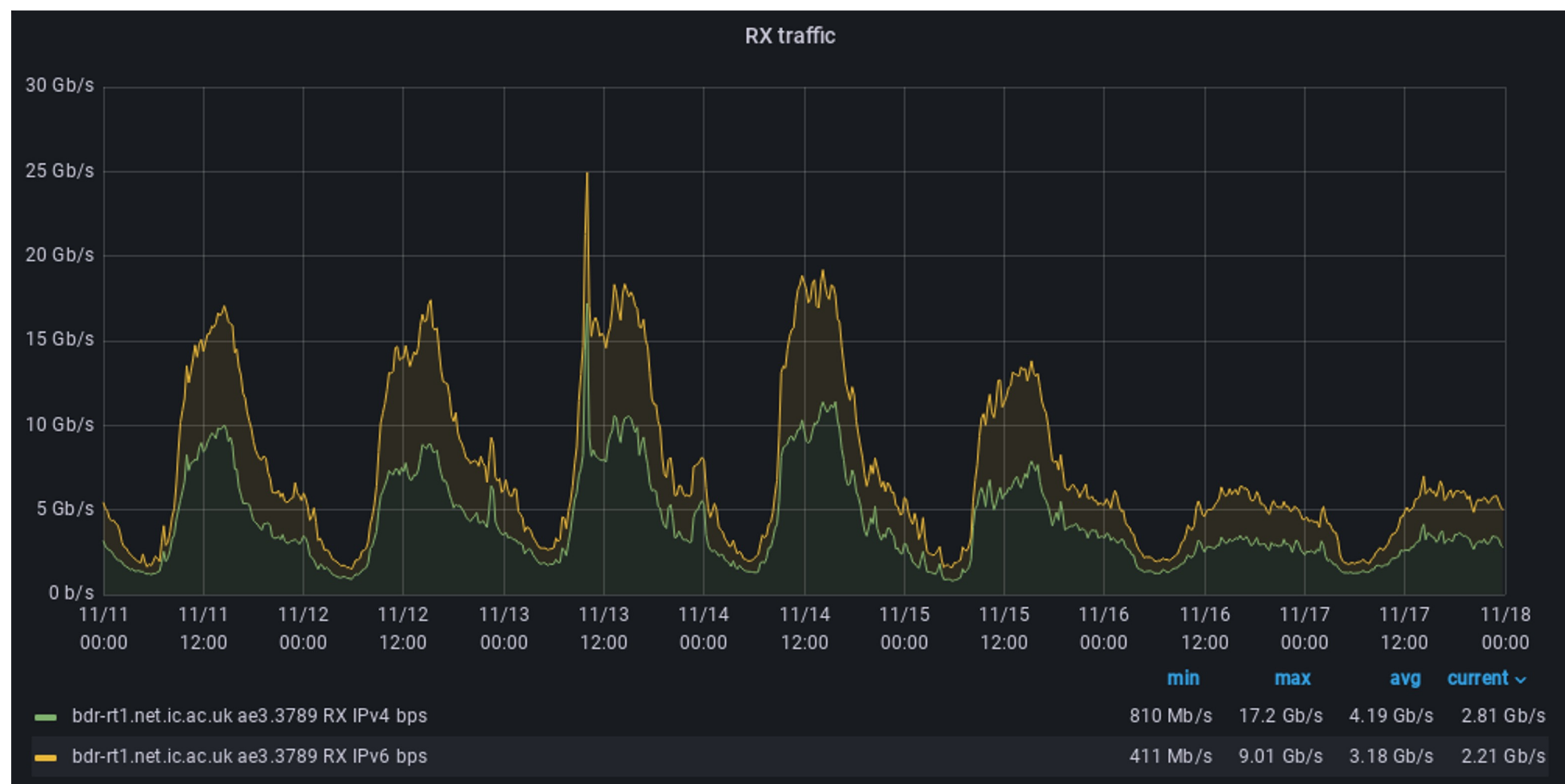
David Stockdale  
19/11/2024

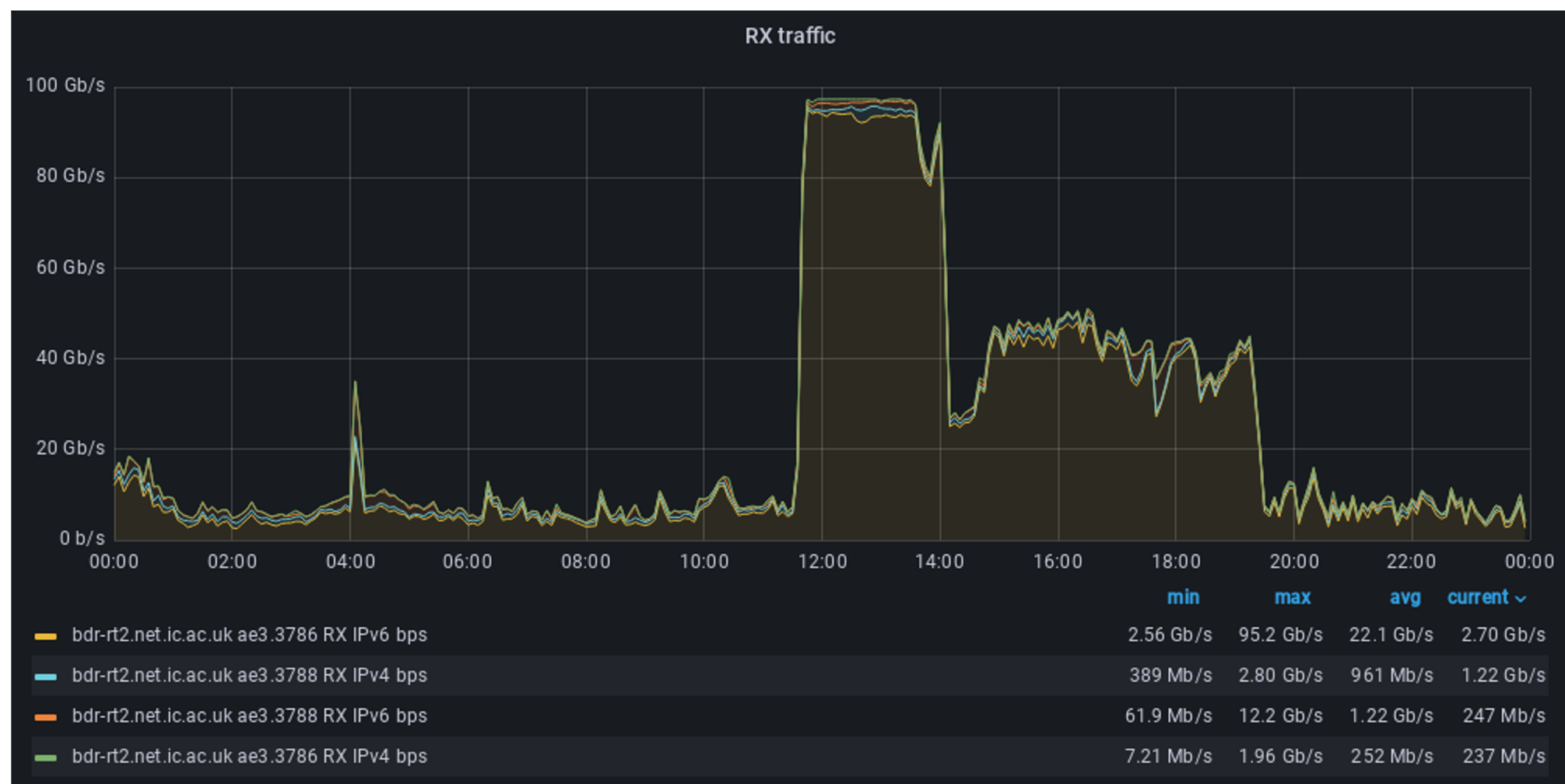
# Introduction

- ~23,000 students
- ~8,000 staff
- ~50,000 unique hosts on wired network
- >35,000 concurrent clients on wireless at peak time
- 2x100G to Janet
- Many VRFs (MPLS L3VPNs)
- Firewalls between VRFs

# Current position

- IPv6 enabled much of network in 2010
- ~50% of our Internet traffic is IPv6
- ~97% for HEP (LHCONE)
- Usual suspects IPv6 enabled: DNS, WWW, SMTP, NTP
- AAAAs on most load-balanced services
- IPv6 mandated in tenders
- Dual stack almost everywhere
- HPC IPv6 only, with DNS64/NAT64 + clatd (464XLAT)
- Wireless...





# Legacy wireless

- ~5000 access points
- On-prem controllers
- EOL platform
- Funding to replace over 1-2 years
- Public IPv4
- DHCPv4 with very short leases
- Dual stack IPv6
- SLAAC
- No NAT

# Next generation wireless

- ~6500 access points
- Cloud based control
- On-prem central tunneling of client traffic
- RFC 1918 IPv4
- NAT44
- “IPv6-Mostly”
- SLAAC, RDNSS
- NAT64/DNS64
- DHCPv4 option 108, PREF64
- IPv6 only management/control

# IPv6-Mostly in a nutshell

- Dual stack network
- NAT64/DNS64 available
- IPv6 DNS servers available
- DHCPv4 option 108
- Client discovery of NAT64 prefix
  - DNS64
  - PREF64
- 464XLAT with CLAT on client
- Built into Android, iOS and macOS

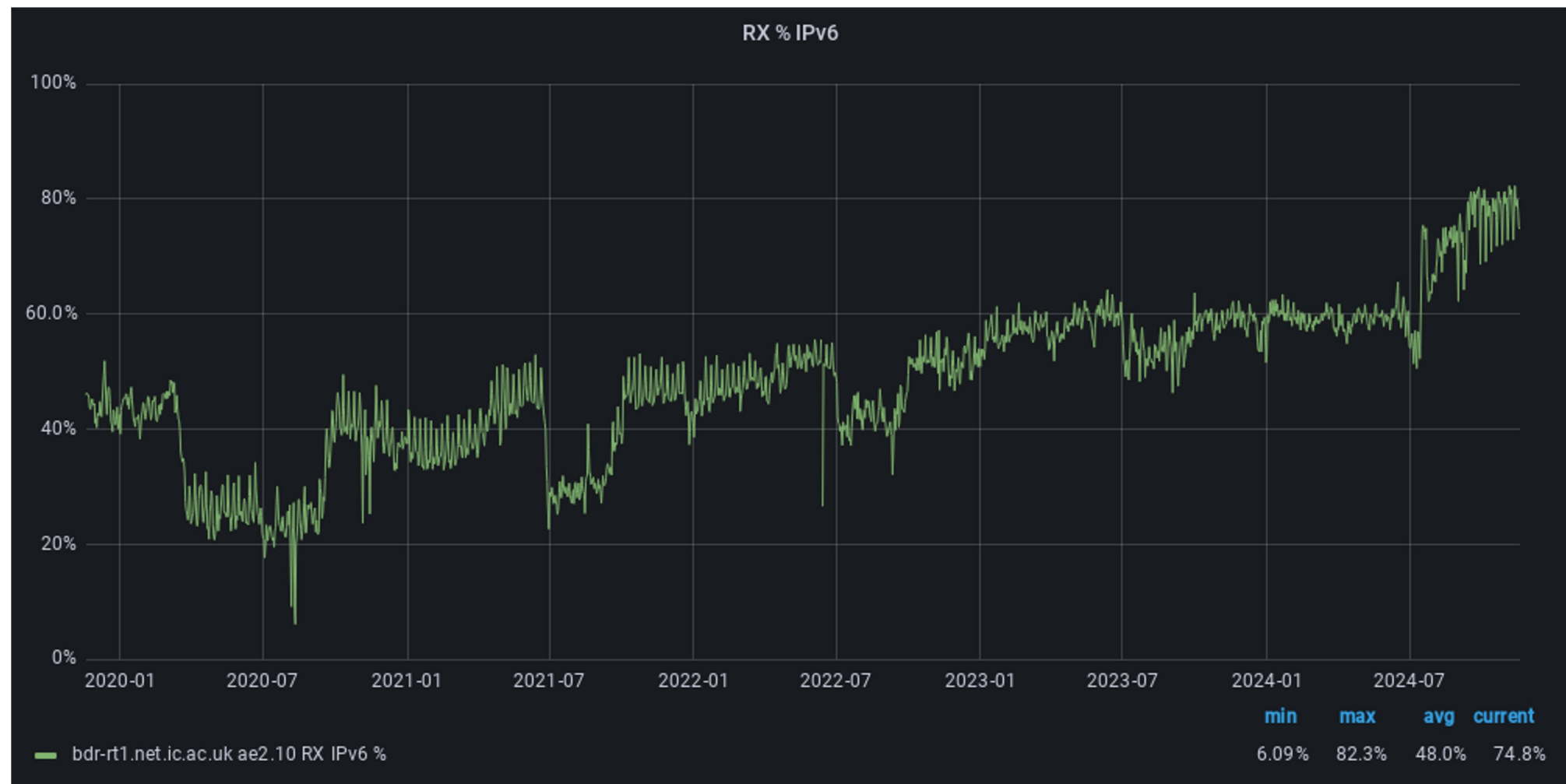


# Management

- SLAAC
- DNS
- NTP
- RADIUS
- Cloud communication (HTTPS)
- Client traffic tunneling (L2TP)
- Dual-stack for now

# Deployment

- Started in June
- Multiple contractors working most weekends July-September
- ~3000 APs now deployed
- ~2400 APs left to replace
- Mostly halls left
- Over last 7 days, on our own SSID
  - 71,000 unique MAC addresses with IPv6
  - 16,000 unique MAC addresses with IPv4
  - 77% of devices IPv6 only



# Experience

- RADIUS load (mostly accounting)
- DHCPv4 load (mostly DHCPDISCOVER)
- macOS 12 (Monterey)
- Wired ports on in-room APs
- WiFi calling on Samsung phones
- Honor devices
- VPNs - Cisco AnyConnect, GlobalProtect, Ivanti Connect Secure, Pritunl
- Wireless screen sharing
- ~50 support tickets opened by customers
- Windows!

# IMPERIAL

# Thank you

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