CERN Networks Automation

IT-CS Marwan Khelif

LANDB 2016

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- - - - - Relationship kept by logic
————— Relationship kept by db (FK)

Diagram sections labelled: NETWORK TOPOLOGY, NETWORK REQUESTS, DIANA – NET LIVE, MIKE, CORE LANDB, STRUCTURED CABLING, FIBERS, PHONE, WIFI, CSDB_SEC, LANDB AUTH, INVENTORY, SOAP, WORK ORDER
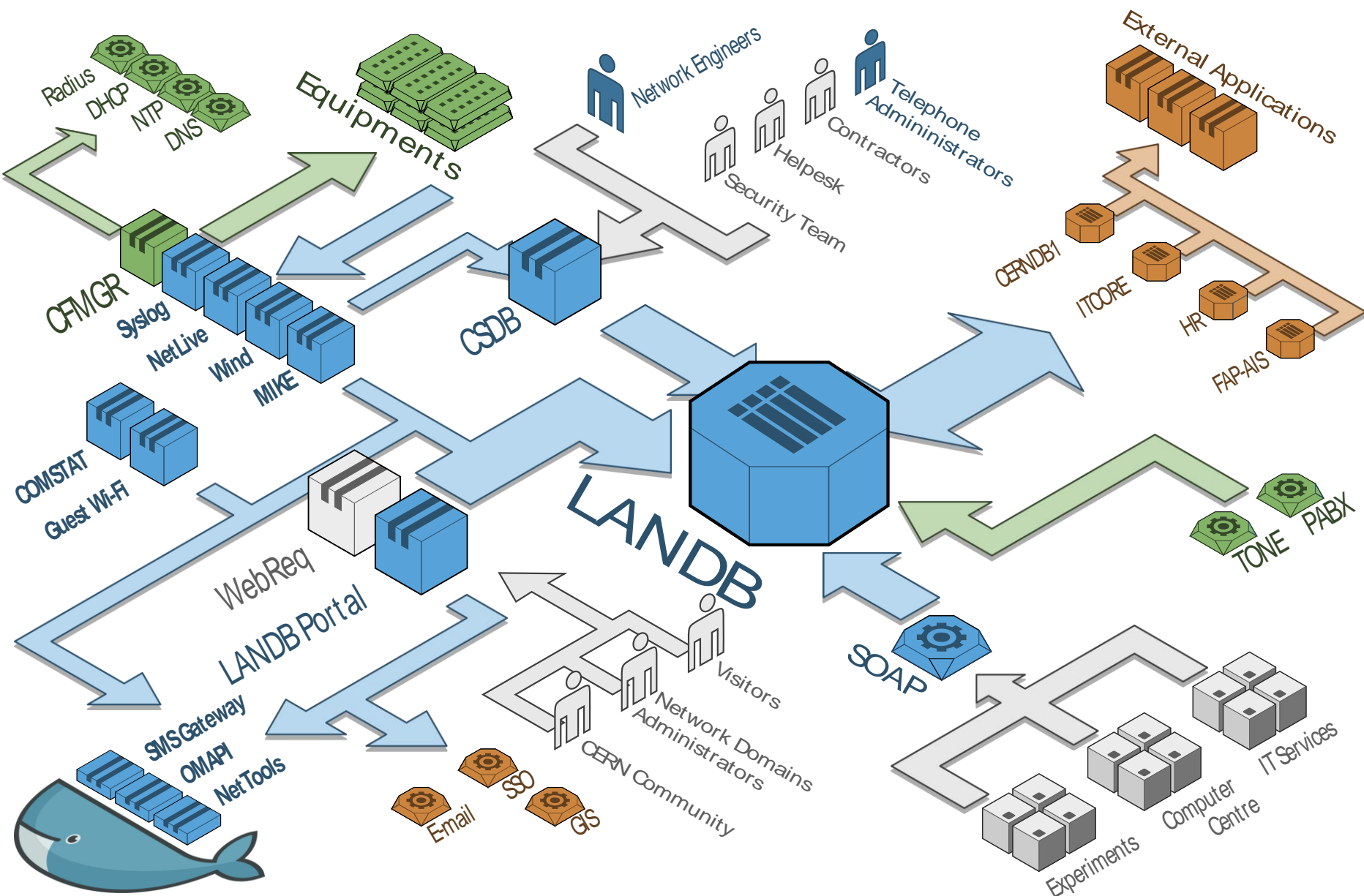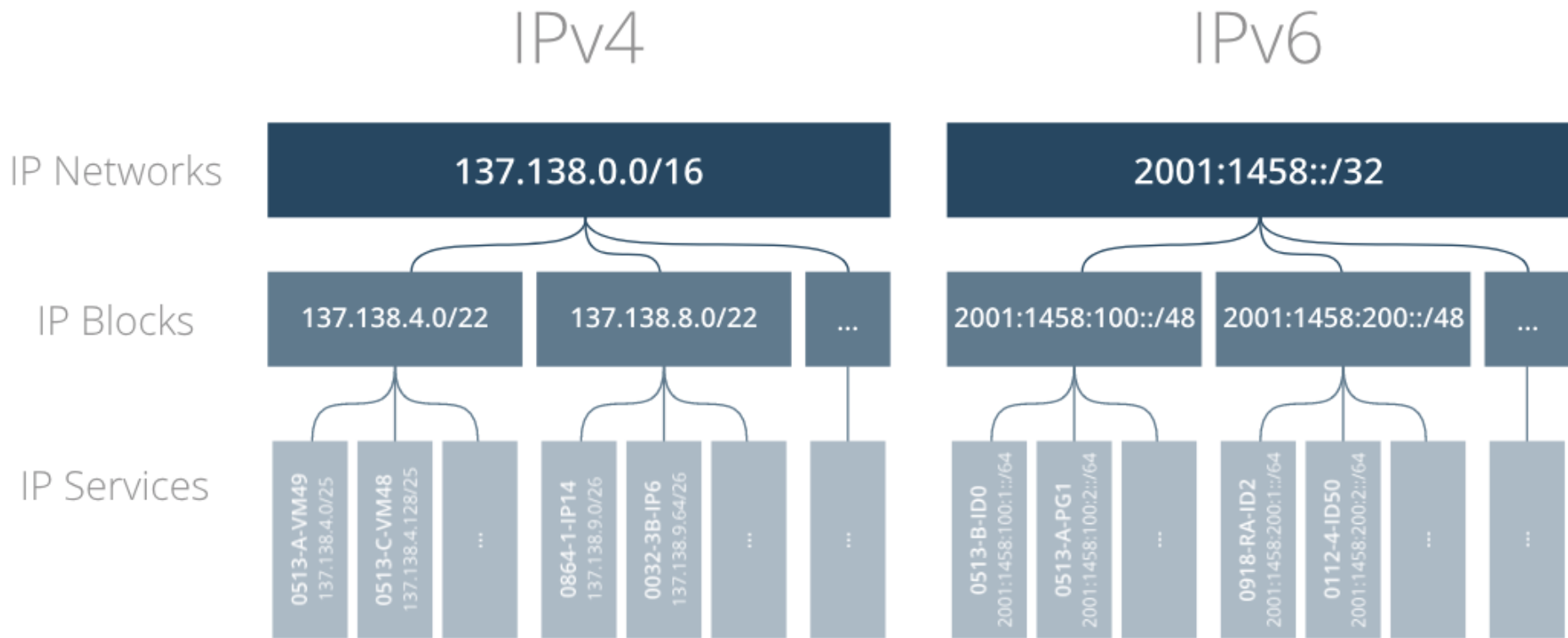
LANDB

- 20+ years old Oracle database

- Covers many aspects of Communication Systems:
    - IPAM / DNS / DHCP
    - Network Topology
    - Network devices
    - Firewall
    - Structured cabling
    - Telephony
    - Security

LANDB

- Multiple applications:
    - CSDBweb (Web) – Network administrators
    - LanDB Portal / WebReq (Web) – End-users
    - SOAP API (Web) – Specific services and users (experiments)
    - CFMGR (CLI) – Configuration management

- Large variety of languages:
    - Java
    - PL/SQL
    - Perl
    - Python

IPAM

IPv4

IPv6

IP Networks

137.138.0.0/16

2001:1458::/32

IP Blocks

137.138.4.0/22 137.138.8.0/22 ...

2001:1458:100::/48 2001:1458:200::/48 ...

IP Services

0513-A-VM49 137.138.4.0/25
0513-C-VM48 137.138.4.128/25

0864-1-IP14 137.138.9.0/26
0032-3B-IP6 137.138.9.64/26

0513-B-ID0 2001:1458:100:1::/64
0513-A-PG1 2001:1458:100:2::/64

0918-RA-ID2 2001:1458:200:1::/64
0112-4-ID50 2001:1458:200:2::/64

IPAM – IP Blocks

- Assigned to Network Domains (GPN, TN, ITS, LCG, …) interconnected by Gates (router interfaces with ACLs)

- Provide same configuration for all IP services – Gateway / DNS / NTS

IPAM – IP Services

- IP Services = Subnets

- Type of service defines configuration properties (MTU, IP 4/6 stack, MPLS, OSPF, …)

- Support both dynamic/static addressing (campus)

DHCP

- Dynamic addressing by default (Campus)
  - Static addressing on users' request
  - Public/internal IP address assignment (IP service)

- Static addressing required for TN

- Pool of IP addresses for unregistered devices

DNS

- Static configuration for main .CERN.CH zone

  - Generated every 5min from LANDB

- Dynamic zones delegated to users

  - Eg: nodes load-balancing service, experiments

  - Specific zone .DYNDNS.CERN.CH for "dynamic" devices (updated from DHCP)

Plans

- DNS
  - Decrease time required to generate configuration (go to dynamic?)

- DHCP
  - Allow user to choose public/internal dynamic addressing

- Standardise applications
  - Standard protocol: NETCONF
  - Languages: Java + Python
  - OpenSource?