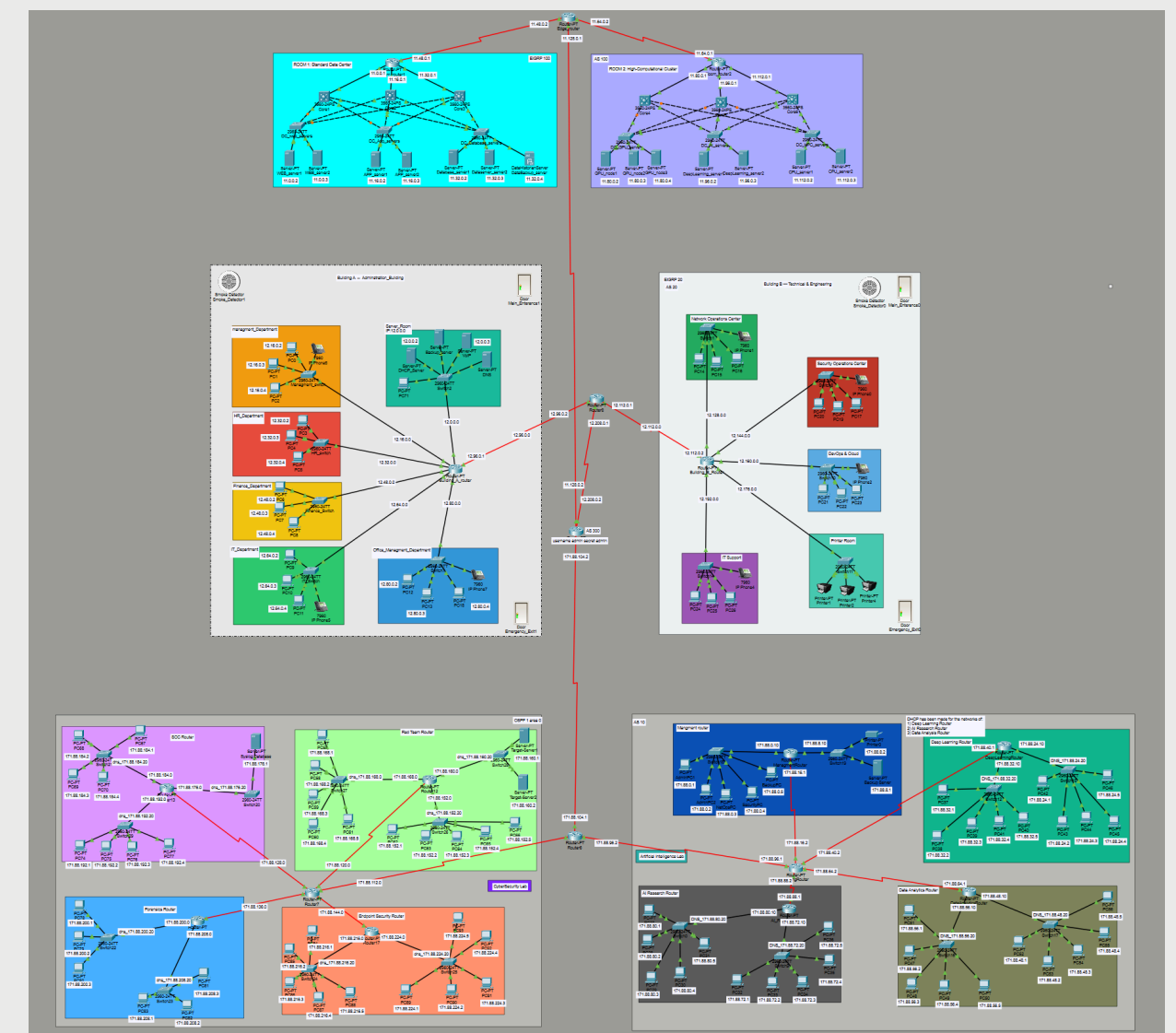# Enterprise Network Architecture with Centralized Data Center

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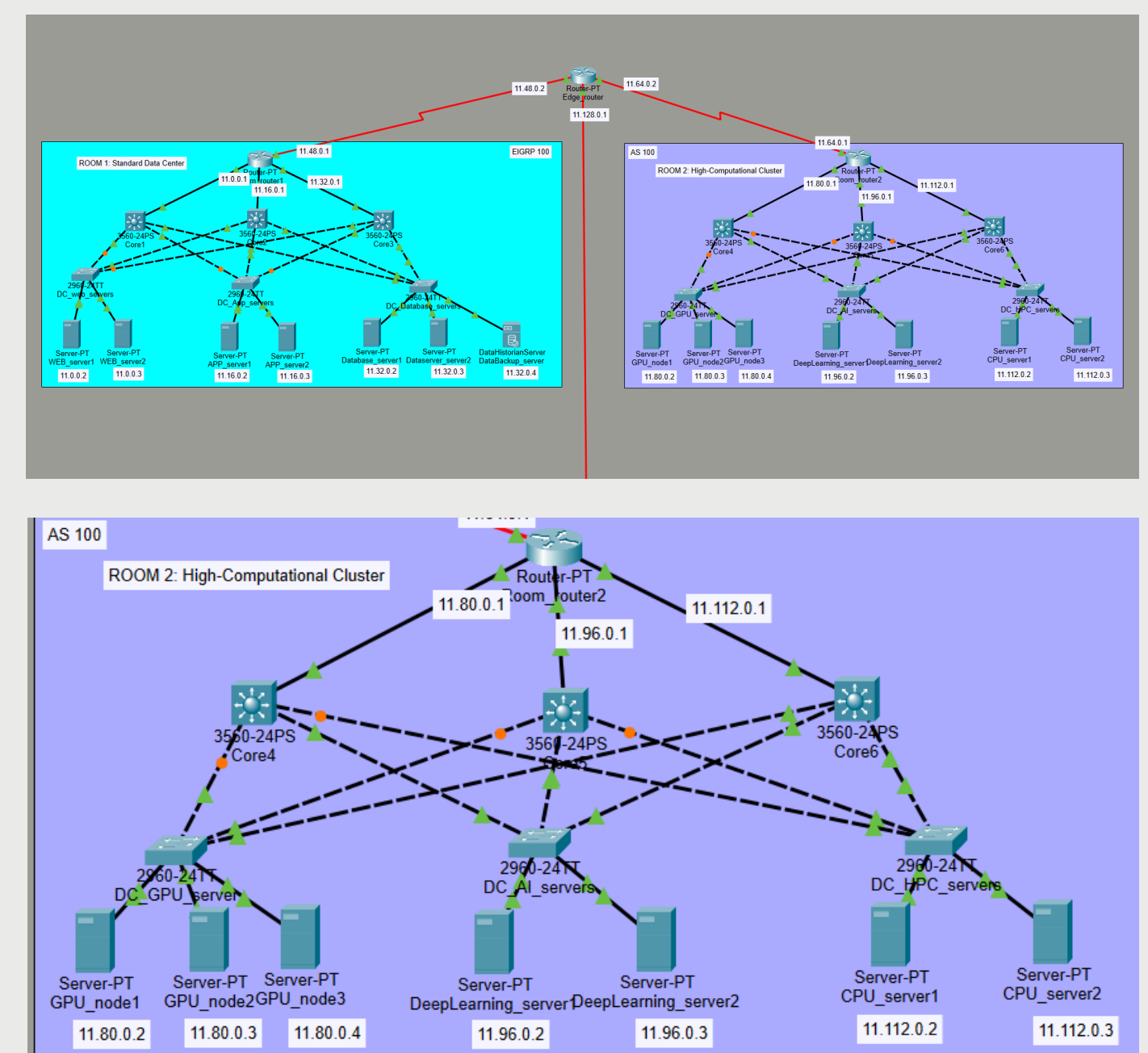
Overall Architecture Overview

- This project presents a **core data center–centric corporate network architecture** designed to support enterprise operations, secure administrative services, and advanced research laboratories.

- The **data center** acts as the central backbone and service core, while corporate buildings and specialized labs operate as controlled access domains interconnected through **BGP-based inter-domain routing**.

- The architecture reflects real-world enterprise and service-provider design principles, combining protocol separation, hierarchical topology, and **strict security enforcement**.
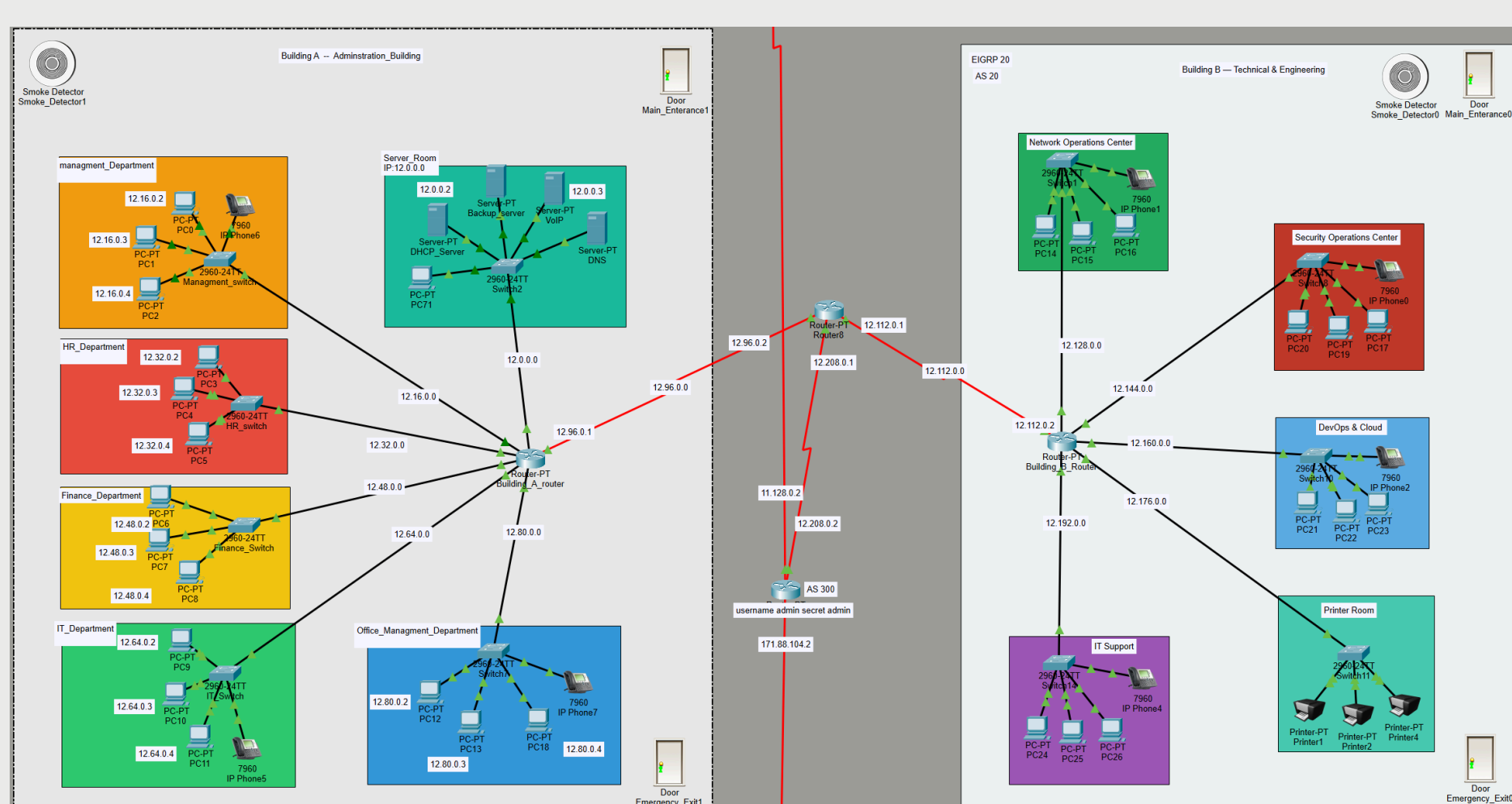

Core Data Center Architecture

- The **Data Center** forms the core of the infrastructure, supporting high-performance computing, application hosting, and AI workloads. It uses a **Spine–Leaf topology** for scalability, low latency, and predictable east–west traffic, essential for HPC and AI tasks.

- Internal routing relies on RIP for simplicity, while BGP manages external connections with policy-based, scalable routing. The data center is divided into Room 1 and Room 2:

  o **Room 1:** Web and application servers for DevOps and Cloud teams (deployment/testing).

  o **Room 2:** HPC clusters, GPU farms, and deep learning servers for AI and cybersecurity research.

- **Strict access control** restricts interaction to authorized domains, ensuring both security and performance.

Corporate Campus Network

- **Two enterprise buildings** connect to the data center via **BGP**.

- **Administration Building:** Management, HR, finance, IT. Hierarchical design with **EIGRP** internally. Departments access core services; direct server access restricted.

- **Technical & Engineering Building:** NOC, SOC, DevOps & Cloud, IT Support. Hierarchical topology, **EIGRP** internal, BGP to data center. More restrictive for security-sensitive operations.

- **Access is restricted:** SOC monitors between buildings, DevOps uses apps/servers, Printers/VoIP stay local; in the data center IT has full access, DevOps uses apps, AI/Cyber labs use HPC/GPU, all else denied.

Research & Cybersecurity Labs

- **Independent research domain** including **Artificial Intelligence Lab** and **Cybersecurity Lab,** using **OSPF** internally for scalable, multi-area designs. Modular hierarchical topology allows labs to operate independently while leveraging centralized resources.

- **Connectivity:** **BGP** links labs to the enterprise and data center, keeping experimental routing separate from corporate traffic.

- **Access:** Cybersecurity labs can access Room 2 in the data center to leverage HPC and GPU servers for AI, deep learning, and security analytics.