

# Automated Infrastructure Management System for a Network Hardware Manufacturer

How creating a modular, user-friendly network controller platform allowed a telecom equipment manufacturer to complement its core hardware products with commercial software, enabling end users to save up to 35% on network infrastructure management, while also positioning the company for new revenue streams and future Data Center Infrastructure Management (DCIM) capabilities.

Industry:  
Telecom

DIGITAL PRODUCT ENGINEERING

SOFTWARE DEVELOPMENT CONSULTING

## Business challenge

In many organizations outside safety-critical environments, network management remains largely unautomated. Enterprises with small networks often tolerate manual methods, turning a blind eye to the **human errors and wasted hours** they introduce.

However, when networks scale, growing with more employees, devices, and higher demands for load balancing and availability, the operational burden becomes impossible to ignore. Once the infrastructure racks up more ports, the illusion of control once provided by a neat Excel tab fades fast.

After outgrowing spreadsheets, organizations **switch to automated infrastructure management solutions** that consolidate real-time network monitoring and configuration into one coherent system.

The problem is that while many solid enterprise-grade remote network management platforms are available, none are easy to get started with. Network administrators and technicians new to these tools **can spend months struggling through the documentation**.

Instinctools was up to the task, crafting a safe, scalable, market-ready solution, seamlessly fitting it into the client's hardware product ecosystem, and ensuring ISO 9001:2015 compliance.

**AIM** is an integrated hardware and software system that automatically detects the insertion or removal of cords, documents the cabling infrastructure including connected equipment, enabling management of the infrastructure and data exchange with other systems.

Our client, a network hardware manufacturer from Germany, saw an opportunity here and decided to **create a new solution with a low entry barrier** even small and mid-sized facilities can take advantage of.

They were looking for a reliable engineering partner to develop an **on-premises, web-based automated infrastructure management (AIM) system with an intuitive UI**. The system was meant to serve as the software component of the client's hardware, which included their own intelligent patch panel and port plugs. It had to deliver the robust functionality of existing platforms, but with a user-friendly interface that simplified adoption. Additionally, it needed a clear roadmap for evolving into a **full-fledged data center infrastructure management (DCIM) platform**.

**DCIM** tools monitor, measure, manage and/or control data-center utilization and energy consumption of all IT-related equipment, such as servers, storage and network switches, and facility infrastructure components, such as power distribution units and computer-room air-conditioners.

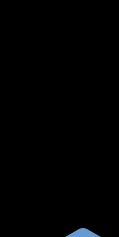
## Solution

The project began with an **in-depth discovery phase**, where we identified the client's initial requirements and collaborated with domain experts to bring clarity and order to the specification draft. Once priorities were set, we mapped out the MVP roadmap, release plan, and detailed technical specification to guide development.

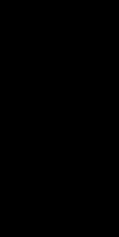
Out of that groundwork grew a **full-scale team** consisting of an Account Manager, Tech Lead, Project Manager, Business Analyst, UI/UX Designer, DevOps Engineer, System Architect, Backend and Frontend Engineers, and QA specialists.

### 01 Deciding on a tech stack

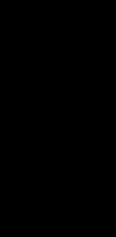
As part of the discovery phase, the team weighed several technology options. From the client's shortlist, which included C++, C#, .NET, Java, Python, and React, the project moved forward with the following stack:



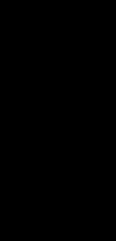
**React** was chosen for the frontend due to the client's existing experience with it, its efficient rendering, and its component reusability across other corporate products



**C++** was reserved for modules requiring low-level integration and fast, lightweight operation.



**Java** was picked for the **backend** for its high performance, strong security, and scalability. Compared with interpreted languages like PHP or Python, Java handles high-concurrency, enterprise-scale workloads more efficiently, making it a strong choice for complex backend systems.



**PostgreSQL** was selected as the primary database management system for its robustness and advanced feature set.

### 02 Making core solution architecture decisions

To ensure the system met the client's expectations, our system architect suggested several strategic decisions that shaped its core architecture.

#### Modular design

As the client wanted to give customers the freedom to select only the functionality they needed, we opted for a **microservices architecture**. Each microservice operates independently with its own database, ensuring scalability and ease of use.

Apart from aligning with the client's business goal, this approach smoothed things out on the development side as well:

- With **interchangeable components**, individual parts of the system can be swapped or updated without disrupting the whole, making future enhancements effortless.
- Independent modules allowed multiple teams to work on different components at the same time, eliminating bottlenecks, and, thus, **speeding up development**.
- Each module was **free to run on the technology best suited for its specific function**, without being tied to a rigid, monolithic stack.

#### Integration readiness

For enterprises to effortlessly plug the solution into their IT ecosystems, our project team **implemented a RESTful API and provided OpenAPI documentation**. As a result, the system can be easily integrated with external tools such as service desk systems, enterprise asset management software, and various monitoring platforms.

#### Ease of data migration

Whether transitioning from manual workflows or legacy AIM systems, customers can easily onboard the platform, with support for importing data from CSV, Excel, or other formats.

### 03 Allowing for flexible work order handling

Beyond real-time network monitoring, the AIM system delivered by the "instinctools team **simplifies day-to-day network infrastructure management** with built-in **work orders** that guide IT technicians through step-by-step tasks and automatically verify each completed action.

Compared to many solutions on the market, this AIM system supports a **broad range of operational scope**, from adding new network racks and connecting patch panels to re-cabling segments, relocating equipment, or replacing failed components.

In addition, system administrators can choose between **two modes** for work handling:

- Through work orders:** every task follows a defined, controlled workflow that ensures order, accountability, and traceability, which is ideal for environments where strict oversight and standardization are necessary.
- Without work orders:** this mode increases flexibility and speed for smaller organizations by removing formalized approval flows, ticket assignments, and status tracking. Teams can quickly add or update equipment instantly, without waiting for administrative steps to complete.

### 04 Designing user-friendly UI

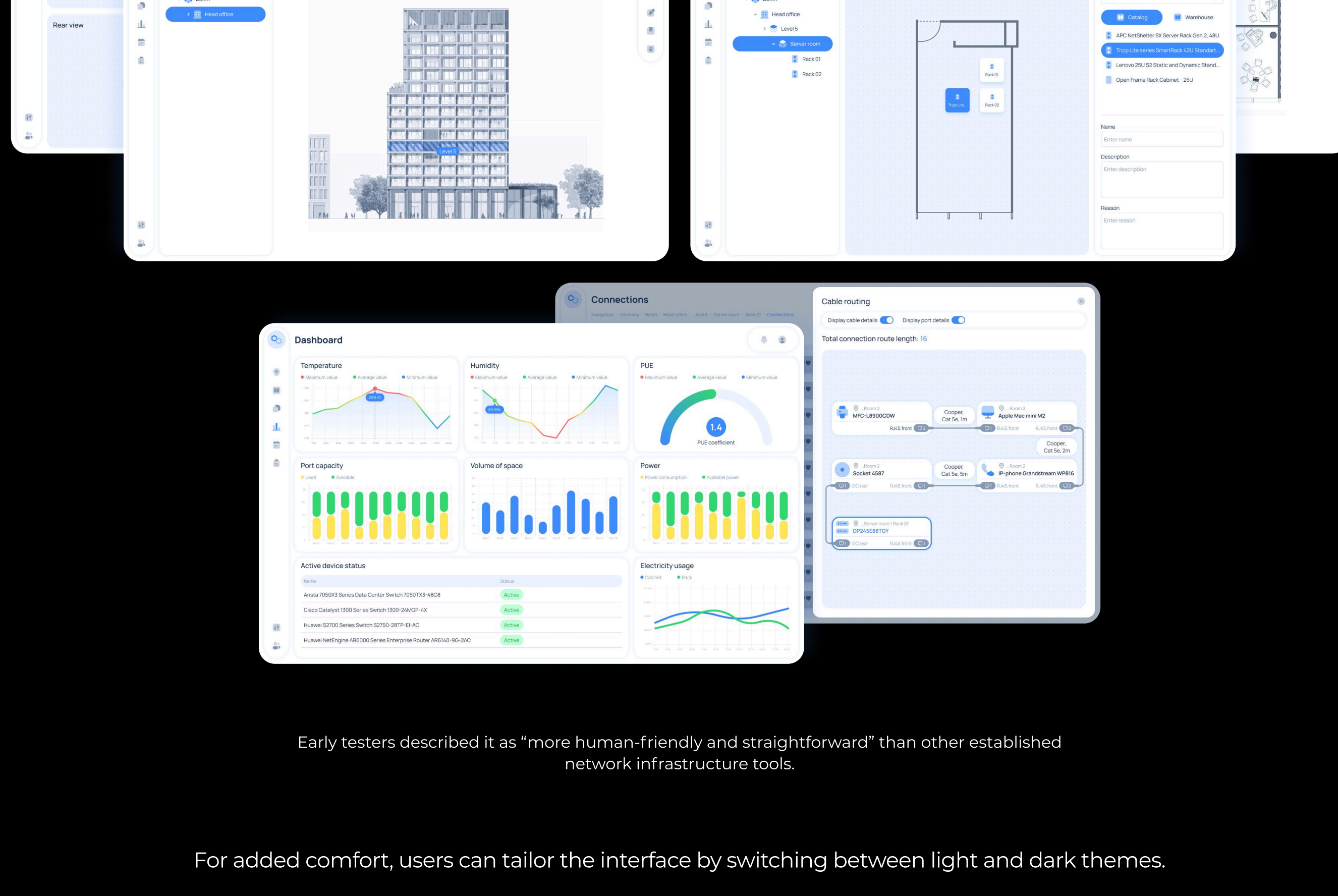
The system's UI stands out for being clear and approachable.

#### At-a-glance clarity

Engineers can instantly grasp room layouts, racks, and network connections through **intuitive visualizations and contextual hints**.

#### Low learning curve

Even **team members with little to no IT background** can onboard quickly, making it a perfect fit for small companies and startups.



Early testers described it as "more human-friendly and straightforward" than other established network infrastructure tools.

For added comfort, users can tailor the interface by switching between light and dark themes.

### 05 Doubling down on security

Security has been addressed comprehensively to address the system's integrity

- Licensed access control**  
Prevents unauthorized use and protects the software from piracy.
- Service registry**  
Keeps track of all application services for reliable communication and scalability, implemented with Java and Eureka.
- Encrypted data transfer**  
All data exchanged between middleware and firmware is transmitted securely using encryption.
- Authentication and authorization**  
Secure login via username/password or SSO, fully integrated with corporate identity systems using Java and Spring Security.
- Syslog monitoring**  
Captures system logs in compliance with OWASP best practices, ensuring secure and auditable logging across the infrastructure.
- Role-based access control**  
Flexible user and group management with granular permissions and safeguards against conflicting edits.

#### Flexible licensing model

The AIM system is licensed based on the number of managed ports

small setups	large enterprise installations
up to 2000 ports	2000-10000 ports

### 06 Planning for DCIM expansion

Following the successful launch, the client is preparing to evolve the AIM system into a full-fledged data center infrastructure management (DCIM) platform. The expanded system will provide real-time insights into power consumption, efficiency metrics, environmental conditions, and the operational status of all data center resources.

#### Key capabilities under development:

- Real-time monitoring of energy consumption and cooling systems
- Comprehensive management of equipment and resources, including servers, racks, and power distribution
- Optimization of data center resource utilization
- Continuous tracking of equipment performance and operational health

## Product benefits

- Easy, reliable management of network connections
- Real-time monitoring of the entire network infrastructure and alerts for issues and unauthorized actions
- Streamlined inventory management
- Data-driven planning for equipment modernization
- Up to 35% cost savings through reduced manual work

## Business value

- By complementing its hardware portfolio with commercial software solutions, the client unlocked additional revenue opportunities.
- The integrated, end-to-end infrastructure management system strengthened the client's position as a trusted provider.
- The client is now seen as a leader in automated infrastructure management.

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