Kansas
Office of Information Technology Services

Transforming
the State of Kansas Network

Network Modernization and Architecture Updates

State of Kansas: Office of IT Services

Category: Information Communications Technology Innovations

Initiated: February 2020

Completed: September 2023

Allie Denning

Director, Public Affairs

Allie.Denning@ks.gov

(O) 785-296-4112

EXECUTIVE SUMMARY

In February 2020, the Kansas Office of Information Technology Services (OITS) initiated a comprehensive network upgrade for the State of Kansas, focusing on the network access layer. This involved deploying new switches and upgrading core devices to accommodate wider bandwidth requirements. The primary goals were to modernize network hardware, enhance architecture, and achieve several key benefits:

1. **High Availability:** The upgraded network ensures predictable service availability for critical enterprise applications.
2. **Improved Operational Expenditure (OpEx):** By replacing expensive services with more economical and flexible broadband options (including secure VPN connections), the State of Kansas can optimize costs.
3. **Enhanced Security:** Real-time access control and threat protection are now possible across broadband internet, bolstering security.
4. **Cloud Optimization:** The network is optimized for cloud platform internet traffic, facilitating efficient data flow.
5. **Simplified Management:** Template-based provisions enable zero-touch configuration, streamlining administrative tasks.
6. **Better Analytics:** Improved network utilization analytics provide valuable insights for resource allocation.
7. **Improved Citizen Access:** The modernized network enhances access to state-provided services, creating a positive end-user experience.

IDEA

The Network Modernization and Architecture Enhancement project represents a strategic initiative undertaken by OITS to transform our network infrastructure. By upgrading hardware, optimizing architecture, and implementing cutting-edge solutions, we are achieving several critical goals and objectives. This project aligns with our commitment to providing efficient, secure, and reliable services to citizens and stakeholders.

KEY GOALS

1. Deprecation of Legacy Architecture
2. Elimination of Single Points of Failure
3. Increased Overall Capacity
4. Enhanced Security and Access Control
5. Optimized Cloud Traffic
6. Simplified Management
7. Advanced Analytics
8. Improved Citizen Access

The importance of the project cannot be overstated. The project contributes significantly to the State of Kansas' digital transformation journey. The modernization of the network empowers citizens, enhances service delivery, and positions us as a model for others. Prioritizing budget and personnel resources is crucial to the success of our modernization efforts as these efforts impact all State of Kansas citizens (2.9 million citizens) and employees. Ten full-time staff, along with the support of others, were dedicated to this project.

Our multiphase approach redesigned and architected the KANWIN network across multiple layers of the network architecture. Within a span of two years, we successfully implemented the project and immediately saw improvements upon device deployments. Moreover, our chosen design facilitates ongoing projects. As a result, there has been limited downtime for the State and its constituent services.

IMPLEMENTATION

ROADMAP

The project management approach adhered to a traditional waterfall methodology, ensuring a systematic and sequential approach. Distinct phases included initiation, planning, execution, monitoring & control, and closure. Clearly defined deliverables and milestones were established for each phase and progress was tracked through predetermined checkpoints.

INITIATING PHASE

The project commenced in February 2020 and employees were sent home in March 2020 due to the COVID 19 pandemic.

Negotiations for the bill of materials (BoM), the task order (TO) for devices and services, the statement of work (SOW) for professional services, and the work requests for installation services occurred from February to August 2020.

ADAPTATION AND REVISED APPROACH

Originally, the plan was to implement the Cisco Digital Network Architecture Center (DNAC) and then use the DNAC to push configurations to the switches as they were deployed. This would give the OITS team time to gain experience with the DNAC appliance and new switches.

However, with the unexpected challenge of the pandemic, we altered our approach when the Kansas Legislature required new switches to support a virtual legislative session that would begin in 2021. Consequently, the Capital building became the priority. The Cisco subject matter expert was on hand to mitigate any issues and ensure a smooth transition. The DNAC was successfully implemented in October and the Capital switches were swapped in November and December.

During the Capital building swaps it was discovered that the existing 10MB ½ duplex solution devices were not compatible with the new switches. The non-compatible devices supported the video camera's through-out the complex. Existing switch stock was used to address this need. All but one of the additional switches were installed by the end of December. The final switch was swapped out after the 2021 legislative session ended.

In total, 759 switches were replaced, and 190 sites were impacted.

LAYER 3 PHASE

As this was a phased approach, the initiating phase of Layer 3 began in March 2023.

Our initial plan was to replace the 2800 and 2900 series Cisco routers with a Cisco replacement model at WAN and MAN sites. We targeted routers that were no longer supported or had reached end-of-life status. We took an aggressive approach to the timeline; however, a delay in receiving the new routers impacted our execution start date by two months. The Layer 3 refresh was completed in September 2023.

Phase Statistics

- Execution Start Date: 1/12/2023 (delayed start date of March 2023)
- Execution End Date: 9/18/2023
- Number of routers considered: 611

IMPACT

FAR-REACHING IMPACTS

Our ambitious project transformed the network infrastructure for the State of Kansas, impacting tens of thousands of employees and the State's population of 2.9 million citizens.

Prior to the project, we were grappling with outdated equipment, architectural constraints, and capacity limitations as well as vulnerabilities. Following the project implementation, we saw a tenfold improvement with the following benefits:

KEY GOALS AND BENEFITS

1. Deprecation of Legacy Architecture:
    a. Outdated legacy components hinder scalability, security, and performance. Our project aims to retire those legacy elements, streamlining our network for future growth.
2. Elimination of Single Points of Failure:
    a. Identifying and addressing vulnerabilities enhances network resilience, ensuring uninterrupted service delivery.
3. Increased Overall Capacity:
    a. The upgraded network accommodates higher traffic volumes, supporting critical enterprise applications.
4. Enhanced Security and Access Control:
    a. Real-time threat detection, access policies, and secure traffic management bolster our defenses against cyber threats.
5. Optimized Cloud Traffic:
    a. As cloud adoption increases, our network is optimized for seamless communication with cloud platforms.
6. Simplified Management:
    a. Template-based provisioning reduces administrative overhead, allowing for efficient configuration changes.
7. Advanced Analytics:
    a. We gain insights into network utilization patterns, enabling data-driven decision making.
8. Improved Citizen Access:
    a. Citizens benefit from faster, more reliable access to state services, providing a more positive end-user experience.

MEASURING SUCCESSES

SWITCHES: Over the lifespan of the project, 860 switches were considered. Of those 860 switches:

- 759 were replaced during phases 1 and 2,
- 93 were removed from the environment, and
- 8 were handled as an operational task and removed from the project.

ROUTERS: The project also had to consider 611 routers. Of those 611:

- 564 routers were replaced with 46 routers determined to either be not needed or descoped from the project
- 17 routers were removed from the environment, and
- 29 routers will be handled as an operational task and removed from the project.

Despite delays in shipments and the onset of the pandemic, the project came in under cost as we were able to procure better prices for the devices and reduce pre-configuration and installation services. The planned cost for the project was $9,635,548.00 and the actual cost was $8,705,764.00, a cost savings of more than $929,784.00.

LOOKING AHEAD

This project, its phases and completion, help to establish the core baseline for continued modernization, optimization, and transformation for the State of Kansas network. The project(s) and its implemented deliverables are part of the core enterprise network of KanWin and will be operationally maintained as our standard service offering and supported and maintained through our enterprise network operations.

The monetary investment of over $8 million dollars as well as the human capital investment of 2.5 years, is a testament to the commitment from the State of Kansas leadership to transform the services delivered to agencies and Kansas citizens through a positive and impactful digital experience. These projects and their initial impact are the foundations to the larger and continued optimizations that the State of Kansas has committed to in the next 3–5-year span.