

Fukushima City Board of Education Uses WAN Control for Rapid Changes in Traffic

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Dynamic control of the WAN with Direct Internet Access (DIA) has enabled a “one device, one student” network.

Executive Summary

Customer Name: Fukushima City Board of Education

Industry: Education

Location: Fukushima City, Fukushima Prefecture

Size: 67 schools, as of November 2021

Challenges	<ul style="list-style-type: none">• The existing WAN cannot handle the increase in traffic of 20K iPads• Simply upgrading would be costly and uncertain in terms of supporting future changes• An essential goal was to identify an effective way to manage devices distributed to each school
Solutions	<ul style="list-style-type: none">• Cisco® SD-WAN• Cisco vManage
Results	<ul style="list-style-type: none">• Direct Internet Access supports internet access for 20K iPads• Flexibility to cope with various changes in traffic in the future• Expanded activities; in addition to their regular classes, students were able to join an online session with the mayor



Under the Global and Innovation Gateway for All (GIGA) School Program proposed by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), schools across Japan are working to incorporate digital technologies into their educational practices. “One device, one student” is the goal of this program, and the network is the critical element to achieve it. How to handle a rapid surge in traffic? “Control” is the objective that the Fukushima City Board of Education has chosen rather than trying to increase network capacity. The Board of Education decided to use the Cisco Software-Defined WAN (SD-WAN) solution to dynamically control the WAN through Direct Internet Access (DIA). They have successfully built an environment enabling them to respond to changes in traffic quickly.

While our society is experiencing a rapid shift to digitalization, academia is also undergoing a major transformation. The GIGA School Program led by MEXT has also sparked transition. The program delivered powerful messages: “one device for one student should be the norm of learning in Reiwa” and “providing an equal learning opportunity and Information and Communication Technology (ICT) environment optimized for children with diverse backgrounds, and helping them develop competencies and skills without leaving anyone behind.” In response to these messages, municipalities and educational institutions across Japan launched various projects.

The Fukushima City Board of Education is one of these institutions. The Board of Education distributed approximately 20,000 iPads to city schools and started a new project called “Fukushima-type online classes.” “Besides the regular classes, we encourage students to use iPads for doing assignments at home so that they will be exposed to ICT daily and have better information literacy. With this kind of environment available, students will be able to continue learning online even if they are unable to attend school under a state of emergency declared during a pandemic like this,” says Osamu Shigihara, a member of the Fukushima City Board of Education.

“We will optimize the WAN accordingly by monitoring the traffic. We are extremely satisfied with the result that we had built the WAN capable of fulfilling the needs of the schools.”

– Osamu Shigihara

Manager of School Education Division, Fukushima City Board of Education

Challenges

The current network cannot support the traffic load with 20,000 iPads connected

Starting with a basic operation like word searches, teachers need to familiarize themselves with the iPad. Then, using various applications, they will write essays, take pictures of plants growing, and watch exercise videos to check body movements. Once these functions are familiar, they can extend the scope of applications, such as using the iPads as digital textbooks for lectures, keeping track of students’ progress, and helping teachers provide individual guidance for each student. Other best uses of iPads include extracurricular activities and remote classes. Before starting Fukushima-type online classes, the Board of Education outlined the policies to improve the utilization level in stages.

The Board of Education also re-examined the WAN. The WAN for Fukushima City schools uses fiber-optic lines and connects the municipal elementary schools and junior high schools with the data center via VPN. The connections are physically separated into the Learning and School Admin network segments according to the usage. The Fukushima-type online classes use the Learning segment of the two.

“As you can imagine, the WAN we’ve been using was not designed for the traffic load with 20,000 iPads connected. Since all communications were routed through the data center, it was obvious that connection to the data center would become a bottleneck, preventing us from using the iPads in the way we expected,” says Takeshi Abe, a member of the Board of Education.

Solution

Using the Control feature for handling changes in traffic instead of enhancing the network

What WAN technology should be used for the Fukushima-type online classes? The Board of Education evaluated several options, and they ultimately chose the Cisco SD-WAN solution.

“Most of the solutions recommended to us would require the scale-up of data center equipment capable of handling a surge in traffic, but Net One Systems suggested a way to optimize WAN control with the Cisco SD-WAN solution. The scale-up of the data center only leaves us the option to add more physical equipment if the traffic load increases in the future. It’s possible to estimate how much traffic load is needed when 20,000 units are connected, but the actual iPad traffic performance is uncertain until we start using them. Our estimates could turn out to be insufficient, or it could be even too much. The Cisco SD-WAN solution gives us the resilience to handle various changes besides the increased traffic load,” says Abe.

For example, Direct Internet Access (DIA) is a typical control feature provided by the SD-WAN. When users access websites requiring the current safety measures, such as source identification using a static IP address, the access will be routed through the data center as it has been. But users can directly access the permitted public clouds or learning platforms via the internet, where the communication speed takes precedence over safety.

“The DIA can resolve the issue that the data center could become a bottleneck. The SD-WAN routers installed in the schools are equipped with the advanced firewall function that provides enhanced security for direct internet access,” says Abe.

“The Cisco SD-WAN Solution gives us the resilience to handle various changes besides the increased traffic.”

– Takeshi Abe

School Education Division Fukushima City Board of Education

Results and the future

Optimizing the control while monitoring usage

The Fukushima City Board of Education adopted DIA for the 48 schools with a particularly large number of students out of the 68 municipal elementary schools and junior high schools. The remaining 20 schools use the conventional setting in which the communications are routed via the data center. Distributing the traffic load can optimize the cost while achieving a good balance of stability and speed in the communications.

“On the first day of the Fukushima-type online classes, I was very nervous. But once I had verified that the iPad environment worked, I was relieved. With Cisco SD-WAN Solution controlling the traffic, we will be ready to tackle all kinds of situations that may arise in the future,” says Abe.

At this point, how the traffic will change and how the Fukushima-type online classes will turn out are unknowns; for example, teachers may add more streaming-based learning content, or the schools may start using communication tools for interacting with other schools more often online. Even so, with the Cisco SD-WAN solution, schools can respond to changes in a timely manner by fine-tuning the security settings and controlling the bandwidth and routes for each application. Plus, administrators can remotely manage the control settings in the Cisco vManage console and reflect the necessary control settings to the WAN without visiting the site. “We will continue to optimize the WAN accordingly by monitoring the traffic conditions, such as the traffic load occupied by updates of the iPad OS and applications, as well as

classroom usage. We are extremely satisfied with the result that we had built the WAN capable of keeping up with the needs of the schools,” concludes Shigihara.

Hosting an online event for school children to meet the mayor

After only a short period of implementing Fukushima-type online classes in the ideal infrastructure built with the Cisco SD-WAN solution, end users have already found many use cases for their iPad.

“I feel like we are making steady progress in getting the best out of the iPad. We hope to find more use cases by sharing good ideas among all schools,” says Shigihara.

The Fukushima City Board of Education is proactively involved in helping the schools expand the scope of their digital footprint. As part of the initiative, they hosted an event, “Fukushima Kids Future Talk,” inviting sixth graders and the mayor of Fukushima City to an online meeting where they talked about the city government's policies and children's future dreams. They believe that one of the best ways to improve information literacy is to experience what the ICT can do through the events like this.

The Fukushima City Board of Education resolved its network and communication issues with the Cisco SD-WAN solution and successfully built an environment for making the best use of iPads distributed to students. For local governments and educational institutions that have deployed the terminals but are experiencing a bottleneck in communication infrastructure, the Fukushima City Board of Education's initiative would be an excellent example to follow.

Learn More

To learn more about Cisco intent-based networking solutions, visit [Cisco vManage](#) and [Cisco SD-WAN](#).