

Ensuring education with network monitoring

$$E=mc^2$$



Schools, colleges and universities are highly dependent on a functioning and performing IT infrastructure. In addition to the classic uses of IT, other areas are becoming increasingly important at a rapid pace: Course materials and books are increasingly offered via the Internet, classes are organized through web portals, and non-IT systems such as building control or laboratory technology are beginning to fall under IT's control. When IT is that critical to the educational mission, any failures or outages may result in serious consequences. IT issues can prevent students from accessing course materials, endanger research projects, and paralyze school administrators.

The solution to preventing these issues is network monitoring. IT needs a comprehensive overview of its entire infrastructure to ensure performance and availability. But, due to the structures and the history of the education sector, IT managers face very special challenges.

Typical challenges in education and research

IT environments at educational and research institutions are often distributed across multiple locations. This may have structural or historical reasons, but in any event, it is a major challenge for IT. Devices and applications must always be available – at all locations – and provide the required performance, data exchange and communication needed between these locations.

Many companies and institutions from the education sector are leaving the traditional way of on-site learning behind and offering a virtual learning environment. Learning content is available online at any time and from anywhere, while students work in virtual study spaces to discuss and collaborate on projects. This requires full availability of online services around the clock. To ensure full availability, IT is usually required to work in shifts or designate someone as a standby, which is an extra burden on the staff. Tight staffing situations at smaller schools and colleges make this extremely difficult, and increase the risk of failure for core services.

While irregular hours poses its own set of challenges, Columbia Southern also has to deal with a heterogeneous infrastructure caused by irregular growth. IT environments are not updated regularly, but in pieces and batch-wise. Modern devices and applications have to be reconciled with outdated legacy equipment. This makes network management extremely difficult. A consistent and reliable verification of the functionality and availability of devices, systems, services, and data speed is time consuming and error prone. The level of difficulty increases with each additional building or branch campus – each with its own unique infrastructure that needs to be reconciled by a centralized IT department.

Laboratory technology, heat and air conditioning systems (HVAC), and building technology all pose similar challenges. Devices and systems like these, which were not originally allocated to IT, are increasingly intelligent and thus integrated into the central IT. This allows merging of responsibility in a concerted infrastructure management, but requires, of course, very different and much broader control capabilities.

PARK HIGH SCHOOL, LONDON, UK

David Crawley, Network Administrator for the London Park High School, considered cost as the cause for this irregular growth:

“Many institutions tend to use computers a year or two longer as it should be done in the ideal case.”

COLUMBIA SOUTHERN UNIVERSITY, ALABAMA US

At Columbia Southern University in Alabama, many students are employed full-time, either in the armed services or as firefighters, police officers, or paramedics. Due to the irregular hours of those jobs, these students need access to required course materials outside of normal school hours. In fact, most logins on the servers of Columbia Southern University occur outside the normal 9 a.m. – 5 p.m. working hours.

In educational institutions, a common use case for network monitoring is to keep track of IT. Based on open-source projects, homegrown solutions have been developed to save money. These are often built by student assistants, who bring the appropriate insider knowledge and are considerably less expensive than a software license. This becomes problematic when these students leave the university and take their expertise with them. The solution that has been self-developed for a low price, then later becomes a barely manageable juggernaut that requires immense effort to operate and evolve. Also, there are often a variety of systems like this, which were set up by different departments and for different purposes. Generating a central overview of the entire IT infrastructure from all these systems is tremendously difficult, if not impossible.

CONCLUSION

- Remote Locations
- 24/7 availability
- Heterogeneous structures
- Integration of not-IT systems
- Inadequate monitoring solutions

Solution: unified monitoring

Besides the challenges listed above, which are typical for the education sector, all general requirements for a monitoring solution must also be met: from easy operation and a reasonable price-performance ratio to comprehensive mechanisms for analyzing and publishing monitoring data and alerting in case of faults and failures. Systems that do satisfy these requirements run under the umbrella term of Unified Monitoring. However, many product offerings in this area are costly and complex, beyond the budget and capacity of many IT teams in educational institutions. That means that a thorough research and accurate weighing of requirements and benefits is required.

Monitoring of distributed locations

There are different approaches for monitoring remote locations. Usually, a full instance of the software is needed at each site. All instances can then be combined in one console to get an overview of all installations. This is a costly and time-consuming method: all instances must be paid for, set up and maintained individually. Paessler brings a different approach with PRTG Network Monitor: So called remote probes are installed at each individual site where they gather the monitoring data and send it via SSL encryption to the central instance which then collects and processes the data. This is an efficient alternative that saves costs (each license of PRTG allows the setting of any number of probes) and simplifies maintenance.

STEVENSON UNIVERSITY, MARYLAND, US

Robert Hutter, Senior Network Engineer at Stevenson University, Maryland:

“The remote probes feature is extremely helpful in monitoring many different systems. With remote probes we can safely monitor different locations and areas on the basis of a central installation and with only one license.”

Monitor heterogeneous IT environments and non-IT systems

No monitoring software can deliver templates for all devices and applications available on the market – there are simply too many. Therefore, it is important that in addition to the support of established standards such as SNMP, WMI, Flow, packet sniffing, etc., those mechanisms are in place to allow a fast and simple way to add „unknown“ products. PRTG offers Custom Sensors, script examples that make it easier for the administrator to write their own scripts for devices and applications.

While many monitoring solutions are still trying to include ready-made templates for as many IT products as possible, there is no way to integrate the diversity of non-IT systems into „Out of the Box“ monitoring. As long as systems from building technologies support KNX bus or MODBUS, they can be integrated relatively easy in some monitoring solutions; if this is not the case, a well-documented application programming interface (API) is necessary. Also, script examples such as the PRTG Custom Sensors can facilitate the integration of laboratory systems and building automation into monitoring.

Relieve staff

Ensuring availability and performance around the clock requires being constantly up-to-date about the status of IT and to be informed immediately in case of any issues. If the monitoring solution provides flexible and location-independent access and alarm features, it can put IT employees at ease. IT staff no longer need to be on site, but can shift work outside normal office hours and into the home office. While remote access through a web browser is a major boost, the gains are even greater if the monitoring solution supports iOS, Android, or Windows Mobile. In this case, a push notification option is desirable to leverage mobile devices.

Guaranteed future by standards and optimized usability

Especially in the field of higher education, there are numerous homegrown solutions developed at great expense. Some are fully justified, because they supervise in-house developed applications or devices for which no standard solutions are available. But often they are just simple solutions, and while the fear of migrating to new solutions keeps the old ones in place, the maintenance of these old systems can hardly be justified. In order to achieve a significant improvement, the evaluation of a unified monitoring solution should place particular emphasis on implementation and maintenance. It makes sense for the new central monitoring system to operate on several individual solutions in parallel, and provide the monitoring results to the central application. This is another argument for a well-documented API and script examples, such as the PRTG Custom sensors.

The central overview

Remote locations, heterogeneous environments, non-IT systems and the integration of specialized monitoring tools all present major challenges to IT departments at educational institutions. With this in mind, the functions of the Unified Monitoring solution are crucial, from its processes to how it publishes and displays all information. While the differences between the various professional solutions are relatively marginal in terms of alerting, there are major differences in dashboards. Overworked administrators are being offered hundreds of different dashboards for selection, or they can even have maps automatically generated, which show all existing devices with all known connections as a vast jumble of icons and lines.

STEVENSON UNIVERSITY, MARYLAND, US

Robert Hutter, Senior Network Engineer at Stevenson University, Maryland:

“The extensive feature set of PRTG Network Monitor allows us far more than we had originally planned. We use PRTG to monitor the WMI data from our Windows server and use the SNMP sensors for our routers, switches, firewalls, and APC UPS – so basically monitoring all of our data traffic“

COLUMBIA SOUTHERN UNIVERSITY, ALABAMA, US

Travis Foschini, IT Manager at Columbia Southern University in Alabama:

“PRTG is like our second shift, working after hours, on weekends and holidays to make sure our network is up and running.“

Again, Paessler goes its own way with the PRTG maps. Through an easy-to-use drag and drop editor, users can generate custom HTML maps quickly, delivering a comprehensive overview of complex infrastructures by incorporating geographic maps or building plans. Often such a map is displayed on a screen and thus serves as a central control center for the entire infrastructure.

Continuous improvement

A suitable monitoring solution continuously collects data on the state of the infrastructure. This information forms the basis for medium and long-term improvements. Bottlenecks can be identified and eliminated, appliances and bandwidth can be purchased as needed, and virtualization projects can be better planned.

POINT PARK UNIVERSITY, PITTSBURGH, PENNSYLVANIA, US

Greg Graeff, Deputy Head of IT at Point Park University, Pittsburgh, Pennsylvania:

“Instead of automatically adding capacity, the historical data helps us decide if it’s really necessary, and if so, to the level that we don’t underestimate the need and have to add more later.”



Example for a PRTG dashboard with external content, e.g. the view from a surveillance camera.

Conclusion

A proper monitoring solution provides a central overview of the entire infrastructure for IT teams of educational institutions. In addition, it has three main tasks:

- Alerting on concrete failures or malfunctions
- Notification of impending problems
- Database for medium and long-term IT optimization

The decisive factor is choosing the right solution: Are the typical criteria in education and the general requirements for a monitoring solution such as alarms, data processing, storage, and publication met?

PRTG Network Monitor combines efficient and uncomplicated monitoring of distributed locations, and vendor-neutral „Out of the Box“ monitoring of different devices and applications with maximum ease of use and a fair and transparent pricing model.

Paessler offers a 30-day trial without further restrictions, allowing interested parties non-binding access to PRTG Network Monitor. If the trial user decides to purchase the product, the test installation can be easily continued. Manuals, video tutorials and an extensive knowledge base are available on the Paessler website for free. Also, for product questions, our e-mail support team quickly provides qualified answers. In addition, Paessler has a broad network of professional service provider partners available to provide help and advice to users.

WE ARE PAESSLER

In 1997 Paessler revolutionized IT monitoring with the introduction of PRTG Network Monitor. Today over 200,000 IT administrators, in more than 170 countries, rely on PRTG to monitor their business-critical systems, devices and network infrastructures. PRTG monitors the entire IT infrastructure 24/7 and helps IT professionals to seamlessly solve problems before they impact users. Our mission is to empower technical teams to manage their infrastructure, ensuring maximum productivity. We build lasting partnerships and integrative, holistic solutions to achieve this. Thinking beyond IT networks, Paessler is actively developing solutions to support digital transformation strategies and the Internet of Things.