Project
Infrastructure Upgrades for Electronic Health Records

Some hospitals and healthcare facilities have been using electronic health records (EHR) for some time, while others have taken a more measured approach adopting EHR. The cost is an obvious factor when an organization chooses to devote the capital required in any new system or technology. Like it or not, the federal government has now made the decision for many hospitals, in regards to EHR. The HITECH (Health Information Technology for Economic and Clinical Health) Act will include financial penalties for hospitals and doctors not using EHR (starting in 2015), thus streamlining the timeline for healthcare providers to move toward electronic patient records.

The implementation of EHR is typically not as simple as adding a new system or installing software. Many, if not most, hospitals require upgrades to existing infrastructures to properly support new EHR systems. To implement EHR properly, a hospital must ensure that IT, mechanical, and electrical infrastructures have the ability support it; as a case in point, the Mercy St. Vincent Medical Center in Toledo, Ohio. As a leader in medical education and patient care, Mercy St. Vincent planned to move to an electronic health record system with a proper infrastructure in place as a fundamental component to any upgrade.

With a campus of approximately 1.4 million square feet, the Mercy St. Vincent Medical Center required substantial upgrades to their existing IT infrastructure to support their new EHR system. Mechanical and electrical systems also had to be reviewed and upgraded to provide essential cooling and power, respectively. The EHR project at Mercy St. Vincent required upgrades to twenty-eight telecommunications rooms (TRs). The addition of an aggressive schedule required close coordination between the owner, contractors, consultants, and engineers.

Three TRs required expansion into adjacent areas, including one in which the hospital's primary network core resides. Eleven new TRs were created to house new network equipment and to facilitate the switch-over to new horizontal cabling. Re-cabling was required in some areas where the network cabling was obsolete. These new TRs expedited the new cabling being installed in patient areas where cut-overs must be well timed and down time must be kept to a minimum. Fourteen TRs remained unchanged, in terms of size, but were upgraded with new equipment to support EHR.

Most of the hospital's TRs had backbone cabling upgrades to support newer network technologies and faster data rates. The fiber-optic backbone links were upgraded to laser-optimized multimode (OM3), as well as, single-mode optical fiber cabling.

Additionally, the medical center's network electronics were upgraded to properly support multilayer switching, as well as 10-gigabit Ethernet backbone links from each access switch. All access layer switches on the campus have dual 10 Gbit/s backbone links (typically using 10GBASE-SR optics); one of which runs to the primary network core switch and one connected to the redundant network core switch.

As with most systems, mobility and therefore wireless connectivity are a necessity. Use of EHR via mobile devices requires comprehensive coverage by the campus' wireless network. A campus-wide site survey was conducted to determine optimal wireless access point (AP) locations. Once these locations were determined, new network cabling was installed to provide gigabit Ethernet (as well as power over Ethernet) links to all APs.

All of these IT-related upgrades for EHR would be useless without corresponding upgrades to the hospital's mechanical and electrical systems.

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Mechanically, all of the hospital's affected TRs had to be evaluated to ensure a proper environment is provided for the equipment in the rooms. Similar to any facilities' TRs, proper temperature and humidity for active equipment is essential. However, unlike commercial buildings, hospital TRs house additional systems rarely found elsewhere (e.g. nurse call, medical telemetry, patient monitoring, etc.). Bottom line: more systems typically equals more cooling.

A proper environment is essential to IT equipment. Exceeding the recommended operating temperature can decrease the expected life of IT equipment and decrease the mean time between failures (MTBF). In a hospital, these networks support sensitive information (e.g. patient records, CT/MRI images, etc.). Ensuring proper operation and minimizing down-time are top priorities.

Electrical upgrades were also required at the medical center to provide additional power to the new IT equipment. The hospital's EHR upgrades included thirty-three new network switches. These chassis-type switches (or more specifically their power supplies) require much more power than an average 48-port network switch. To support the power requirements of the new switches, multiple 30 A, 208 V single-phase outlets (NEMA L6-30R) were installed in the telecom rooms. Not only was additional power needed, but the network equipment must be on electrical circuits backed-up by the hospital's generators in case of an outage.

The hospital's telecommunications grounding system was upgraded and extended to the new telecommunications rooms in order to comply with applicable standards (e.g. TIA-606). The addition of eleven new telecom rooms meant that telecom grounding busbars (TGBs) needed to be added, as well as, associated bonding and grounding of related equipment, cable shields, and raceways.

Mercy St. Vincent Medical Center has made the commitment to invest in electronic health records and to do it properly. Close coordination between the owner, IT personnel, contractors, engineers, and consultants is required to complete a project of this importance. Not only to complete the project on time, but also to complete it right. Close attention to related infrastructure upgrades is essential to provide proper IT, mechanical, and electrical systems which are fundamental to implementing an electronic health records system.