Open since March, Mediclinic’s latest state-of-the-art hospital – Mediclinic Midstream – serves the growing community in Centurion’s new Midstream Estate. The birth of this brand-new hospital took huge amounts of planning and attention to detail to create an innovative, patient-centric medical centre that is the finest in South Africa. Mediclinic Midstream combines the latest global medical technology with operationally sound environmental best practices to service the growing community of more than 4,500 families in the area.

PROJECT MANAGER’S REPORT

Vital Statistics

Mediclinic Midstream is a 176-bed multidisciplinary hospital that enhances Mediclinic’s acute-care expertise and complements the services currently offered by Mediclinic in the Pretoria/Tshwane region.

This R570-million facility is made up of medical, surgical and obstetric units, a high care unit (HCU) and critical care unit (CCU), a 24-hour emergency centre, a radiology department and consulting rooms for specialists. The sophisticated surgical complex has eight state-of-the-art theatres, including a heart theatre and a catheterisation laboratory. There’s also capacity to build more nursing units, theatres and consulting rooms in the future.

Mediclinic Midstream hospital manager, Ferdi Kotzé, says, ‘The transformation from a building site to a state-of-the-art private acute healthcare facility has taken two years and resulted in one of the most technologically advanced hospitals in the Mediclinic
stable. The modern infrastructure, technology and expertise of specialists and staff will enhance patient safety and place a high focus on the patient journey. Mediclinic Midstream is constructed around the five brand drivers (Exacting, orchestrated, practical, human and deliberate) and we employed staff who are passionate about the values of Mediclinic, ensuring a sustainable future for the business.’

Patient-Focused and Environmentally Sound
Detailed planning has gone into ensuring that Mediclinic Midstream places as little strain on the surrounding community and environment as possible. Built in a pavilion style, the separate buildings link to a central point so that the structure sits better in its environment. Kobus Jonck, general manager of projects for Mediclinic, says: ‘The new facility had to reflect the great knowledge and practical experience that Mediclinic has obtained over the years. The overall design allows for practical patient, public and staff workflow that supports current nursing procedures. Every effort was made to ensure the shortest and most logical link between different departments within the hospital.’

Designed to help with the healing process of patients, all wards are flooded with natural light, but the building also uses energy-saving fluorescent lighting with electronic control gear or LED or solid state light technology – these not only consume considerably less electrical energy than filament or incandescent-type lights, but also reduce the heat load in the building. Plus, the building has been fitted with occupancy sensors to switch the lights off (and on) in low-occupancy areas.

The building also includes solar water heating, heat pumps to centralised ventilation, inverter-controlled air-conditioning, energy exchangers, shading louvres for windows, low-emission glazing, insulated walls and roofing, plus the necessary infrastructure for grey water recycling.
Electrically, the ‘green’ effect of indigenous plants and other growth will be used to soften the energy loads of the environment on the building. The rest of the storm water systems will collect and re-use water. On-site waste sorting will be introduced to retain as much recyclable material as possible, thereby keeping to a minimum the quantity of waste bound for landfill sites.

MEDICLINIC MIDSTREAM BY NUMBERS

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,446,145</td>
<td>Number of bricks used in building the structure</td>
</tr>
<tr>
<td>15,427m²</td>
<td>External paint</td>
</tr>
<tr>
<td>29,021m²</td>
<td>Internal wall paint</td>
</tr>
<tr>
<td>8,685m²</td>
<td>Metal sheeting used for the roof</td>
</tr>
<tr>
<td>43,000m²</td>
<td>The amount of site cleared</td>
</tr>
</tbody>
</table>

ELECTRONIC ENGINEER’S COMMENT

In the pre-internet protocol (IP) world, hospital communication systems were primarily devoted to telephone systems and life safety monitoring applications such as nurse call systems and fire alarms. Today, multimedia, vital medical equipment and data-intensive clinical and/or diagnostic systems are placing huge demands on hospital communication infrastructures. Diverse IT applications and platforms, common among health care providers today, create a significant degree of complexity, raise costs and lengthen implementation time. A converged, radically simplified architecture, which eliminates the complexity and reduces the cost of detailed planning has gone into ensuring that Mediclinic Midstream places as little strain on the surrounding community and environment as possible.
large-scale system implementations, is a critical pre-requisite to success and the overall patient experience. It is thus why Mediclinic sought assistance from CKR iT Consulting, when designing their new state-of-the-art healthcare facility in Midstream.

CKR iT Consulting was responsible for the consulting, design and implementation supervision of the following systems, within Mediclinic’s new Midstream healthcare facility.

**IP MATV System**
The DSTV IP HD television experience system was installed, at Mediclinic’s new healthcare facility, and it provides life-like viewing, sharper images, more vibrant colours and precision picture quality - all in high definition, at each bed. The solution is the first of its kind in SA, and facilitates the DSTV services over an IP network, allowing system integration to offer internet, telephone and DSTV via a single network outlet.

The solution also provides interactive functionality where guests can learn about the hospital, view current news and weather feeds, catch up on emails and even order their daily meals. The IP MATV system is also integrated into the nurse call system, allowing guests to seamlessly control all functionality of the IP MATV system from a single bedside remote control.

**Access Control & Security Systems**
In the ever-changing hospital environment, employees need access to multiple areas in order to perform their job functions, often taking on multiple roles. Within Mediclinic’s new healthcare facility, the control and management of access is achieved through a set of three independent security functions, collectively known as AAA (authentication, authorisation, and accounting) which is deployed throughout the hospital.

The Impro access control system gives personnel the permission to access only their approved working areas. An IP based access control system is utilised to provide the hospital operators with the greatest deal of flexibility brought about by a converged network solution. An intercom system is also linked to the access control system whereby operators can automatically connect to various parts of the hospital and remotely open access control doors for hospital guests. Proximity card and access code systems are installed in areas such as: General Areas, Operating Theatre Change Rooms, Technical Workshops, Pharmacy entrance from inside the facility, Psychiatry, Paediatrics, Obstetrics, Haematology, Adult Intensive Care Units, Adult High Care Units, Neonatal ICU, Neonatal High Care Wards, Administration Offices, ICT Server Rooms, Plant Rooms, Baby rooms, Parking Garages / Lots, Document Archives, Theatre Consignment Stock Access, VIP Room Suites.

**IP CCTV – Video Monitoring System**
The Avigilon IP HD surveillance system is installed at Mediclinic Midstream. Avigilon
HD cameras, ranging from one to three megapixels varifocal cameras and Pan Tilt Zoom (PTZs), are strategically installed throughout the hospital. The solution operates over the converged IP network architecture and provides the hospital with system flexibility. The system provides surveillance for criminal activity and work progress.

The system is also designed to integrate with the access control system whereby forced access control entries and offline access control doors are automatically monitored by the CCTV system. Security personnel manage the integrated system using Avigilon Control Center network video management software with HD Stream Management and store 30 days of footage using the combined Avigilon network video recorder and storage solution.

By monitoring the Avigilon HD Surveillance System live, security personal and facilities management can act on potential break-in or criminal acts before they happen. Mediclinic can also save on HR-related costs by leveraging the Avigilon HD Surveillance System to monitor employee performance.

Physical Network Connectivity
Cat6A UTP infrastructure - in February 2008, the Telecommunications Industry Association (TIA) approved TIA/EIA-568-B.2-10. This standard defines the parameters for running 10 Gigabit per second Ethernet over Augmented Category 6 UTP copper cable. Mediclinic’s new Midstream healthcare facility thus contains a network that is fully compatible with both Gigabit Ethernet and 10 Gigabit Ethernet.

OM4 Fiber Optic infrastructure - Multimode fibers are identified by the OM (“optical mode”) designation as outlined in the ISO/IEC 11801 standard. M4, for laser-optimised 50um fiber having 4700 MHz*km EMB bandwidth designed for 10 Gb/s, 40 Gb/s, and 100 Gb/s transmission.

Fiber Types and Reach

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Bandwidth Length* Distance 10GBASE-SR</th>
<th>Distance 40GBASE-SR4 &amp; 100GBASE-SR10</th>
</tr>
</thead>
<tbody>
<tr>
<td>OM1</td>
<td>160-200</td>
<td>33m N/A</td>
</tr>
<tr>
<td>OM2</td>
<td>400-500</td>
<td>82m N/A</td>
</tr>
<tr>
<td>OM3</td>
<td>2,000</td>
<td>300m 100m</td>
</tr>
<tr>
<td>OM4</td>
<td>4,700</td>
<td>400m 150m</td>
</tr>
</tbody>
</table>

* = Bandwidth*Length Product (MHz*km or GHz*m)

In light of the above information, CKR iT Consulting recommended the use of OM4 fiber, throughout Mediclinic’s new Midstream healthcare facility.

Why Convergence? The Possibilities for Mediclinic’s healthcare facilities:
- CPOE - Computer Based Practitioner Order Entry
- CDDS - Clinical Decision Support Systems
- EHR - Electronic Health Records (eg. SAP)
- Interactive patient information and entertainment systems (IP MATV, Video and Audio on Demand)
• Building automation systems (access control and workforce management, IP CCTV etc)
• RTLS - Real-Time Locating Systems for tracking of personnel, patients and equipment (eg. Maternity ward for tracking of infants)
• PACS - Picture Archiving and Communication Systems
• Mobility for Multimedia Devices (Tablets, Wireless IP Phones, Cell Phones)
• IT Systems, Workstations, Data Storage etc

The future for Mediclinic’s Technology Convergence Levels:

1. Infrastructure Convergence
Common communication platform allows information sharing across both wired & wireless systems. This shared infrastructure allows information flow between medical equipment, systems and related applications throughout the facility.

2. Network Convergence
Leverages a common network and switches, allowing the co-existence and utilisation of telephone, video and data comms. This can enable typical enterprise voice/video/data systems, as well as specialised systems such as security, paging and asset tracking.

3. Data Convergence
Common data formats reside on a centralised network, enabling timely, efficient sharing between applications. The goal of data convergence is to get the right information to the right people when, where and how they need it.

4. Operational Convergence
The integration of multiple systems data will yield a synergistic data flow, enabling optimum hospital staff co-operation and collaboration and an improved patient care experience.

In Summary
Mediclinic’s IT convergence can be planned and accomplished incrementally over time, beginning with the infrastructure foundation. CKR IT Consulting’s goal, however, was to ultimately achieve the level of convergence that best met Mediclinic’s needs, timetable and budget.

The advantages of Mediclinic’s new IT converged infrastructure include:
• Better accessibility of information for mobile clinicians and caregivers
• Optimised information flow across functional areas
• Easier installation of new patient care or facility management applications
• Mitigation of duplication among communication infrastructures
• Simplified command-and-control via an open network, secure and non-proprietary protocol
• Lower operational and administrative costs, and lower total cost of ownership

The sophisticated surgical complex has eight state-of-the-art theatres, including a heart theatre and a catheterisation laboratory.