The concept of smart cities has emerged as a key solution to address the challenges that overpopulated cities across the world currently face. {K2Splitter} The concept of smart cities has emerged as a key solution to address the challenges that overpopulated cities across the world currently face. In order to ensure that a city's infrastructure is able to meet its current as well as future requirements, countries are making concerted efforts to integrate technology in city functioning, thereby making it "smart". In a smart city, having a robust digital infrastructure is as important as physical infrastructure.
A smart city essentially has three layers – the application layer, the information highway and the core. At the core lies the command and control centre (CCC) and data centres where all the data flowing from the application layer is analysed and informed decisions are taken. Therefore, the CCC is a critical element of the digital infrastructure in a smart city.

The concept
A CCC essentially comprises various technologies and engineering functions that enable automated decision-making. A smart city thrives on interconnectedness of various services and applications. For instance, energy and water services will have to be connected with smart grids and smart meters, waste management with vehicle tracking, disaster management services with control rooms and early warning systems, transport services with automatic traffic management, safety and law and order with surveillance cameras, etc. These connected services generate huge volumes of data that needs to be stored and analysed in order to take the necessary decisions. It is here that the role of the CCC becomes important as it enables a system to examine data from multiple correlated sources of information and take real-time decisions.
A holistic and integrated CCC for a smart city will typically include a video surveillance system, video management software, video analytics and an operation centre. The integrated CCC is critical, as it is responsible for processing data or information that is generated from multiple sensor systems, guiding a sensor or control point to act in a desired manner to address a city's needs in the most optimal way, collecting, collating, corelating and analysing data to enhance the experience for improving future responses. In addition, the CCC will help in integrated city management, thus improving resource utilisation, response time and decision-making.

Progress so far
The smart cities initiative has taken off and a number of cities are working towards enhancing their infrastructure set-up. The first step towards the implementation is setting up a CCC. In June 2016, the Andhra Pradesh government launched the CCC for Visakhapatnam as a part of the smart city project. The CCC will enable real-time monitoring through supervisory control and data acquisition (SCADA) pertaining to various aspects such as pollution levels, weather and temperature, and water supply. Earlier, as part of the Digital India campaign, the state had launched Andhra Pradesh FiberNet to provide internet speeds of 15-20 Mbps to each household in the state. The CCC will utilise the FiberNet infrastructure to connect various state departments for addressing civic grievances in real time. Through FibreNet, each electric pole

would be turned into a smart pole and the CCC will enable the civic administration to monitor wards and streets to address various civic issues. Initially, the areas that will be covered are the revenue system, citizens' charter, environmental data forecasting (pollution levels, temperatures and weather), bin monitoring, solid waste management, vehicle tracking, the energy management system for street lighting, and smart traffic and surveillance. It will also have smart street lighting dashboards, air quality monitoring, integration of the water SCADA system for reservoirs and city water distribution systems, centralised solid waste monitoring capabilities, tools for revenue assurance and enhanced city surveillance, and green maps for urban forestry monitoring and beach safety.

The state will set up a permanent building for the CCC at an estimated budget of Rs 1,400 million. The CCC, which is likely to take a year or two to be fully developed, will primarily serve as an e-government centre, which will also double as a disaster management centre housing several departments, such as revenue, tourism and police as well as the Greater Visakhapatnam Municipal Corporation and the pollution control board, thus helping the city respond to an emergency in a coordinated manner. By connecting multiple key city-level services and providers on a single platform, the CCC is expected to usher in smarter and more efficient governance for the city's municipal corporation. The government will also bring more services on board in a phased manner. These include proactive revenue protection, mobile workforce management, video analytics, smart energy, open data portal and smart transportation.

Meanwhile, Raipur, as a part of its Smart City initiative, has invited bids to engage consultants for setting up a CCC. Raipur Smart City Limited, which is the special purpose vehicle for implementing the smart city project, has proposed to execute several smart solutions through the More Raipur City Operations and Control System (MRCOS). This will provide a digital platform for integrating multiple city subsystems such as traffic management, parking, bus/para-transit operations, common payment card, emergency response and city incident management, along with seamless integration of the city's utility operations requirements.

The city will have various gateways connecting the CCC to various sources of data, a visual interface between city operation centres and its operators, as well as bidirectional communication and interaction with citizens. Finally, analytic computational capabilities will lead to customisation of solutions. In terms of usability, the CCC will provide an enhanced visual user interface that can be customised based on the operator's role.

The Gujarat International Finance Tec-City (GIFT), one of the earliest smart city projects in the country, has already installed a fully operational and centralised city CCC to help the authorities check the status of various services in the city in a holistic manner and mange them on a real-time basis. There are two components of GIFT City's CCC. The first one will host all the utilities and provide a complete view of the city's infrastructure, while the second part will include CCTV surveillance, integration of intelligent building management systems, tracking of critical parameters like fire and safety, and deployment of intelligent traffic management systems. Integrating various types of infrastructure and utilities on a single optic fibre-based information and communication technology system will enable GIFT City to proactively monitor and manage the city's infrastructure, and take informed decisions. The CCC will essentially integrate the internet of things (IoT) implemented across various infrastructure within GIFT City.

Opportunities for the telecom industry

The CCC lies at the heart of a smart city and is critical for its successful implementation. To support this mission-critical infrastructure, a robust communication set-up is of paramount importance. While maintaining uptime at the CCC is essential to ensure data flow, informed decisions taken after analysing this data also need to be communicated on a real-time basis. To this end, a well-functioning, secure and reliable optical fibre network is required, over which a city's critical services can be connected. As more cities prepare their infrastructure under the Smart Cities Mission, the demand for IoT-enabled devices and connectivity (both wireless and wired) will only grow. Meanwhile, telecom service providers and equipment vendors can leverage the demand arising from this segment to drive future growth.

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