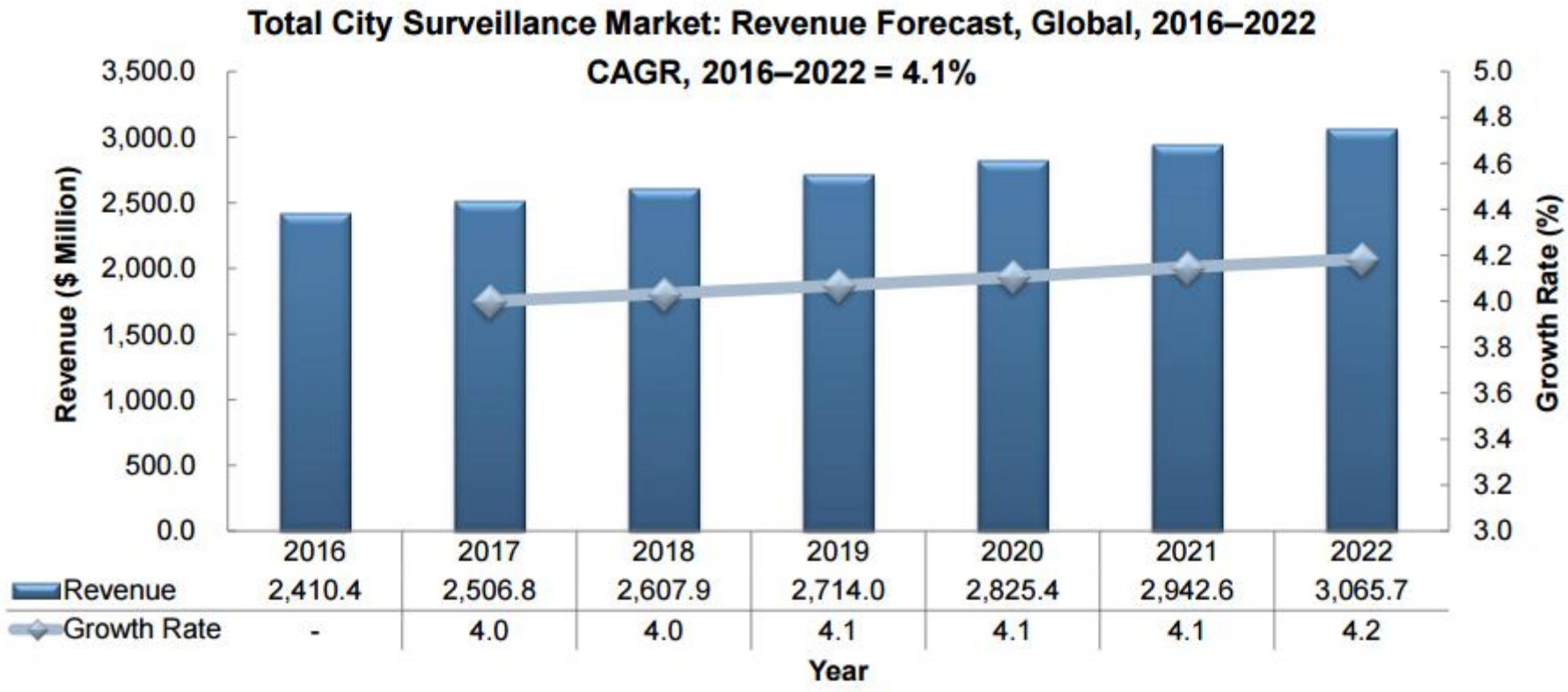
FROST & SULLIVAN

City Surveillance Market Outlook and Projects in India

August, 2017

Global City Surveillance Market (2016-2022)

Spending in city surveillance will increase steadily during the forecast period. This will be driven by smart city infrastructure expansions and associated upgrades with a focus on decreasing the cost of IP cameras coupled with the deployment of continually improving intelligent analytics and video management solutions and smarter storage systems.

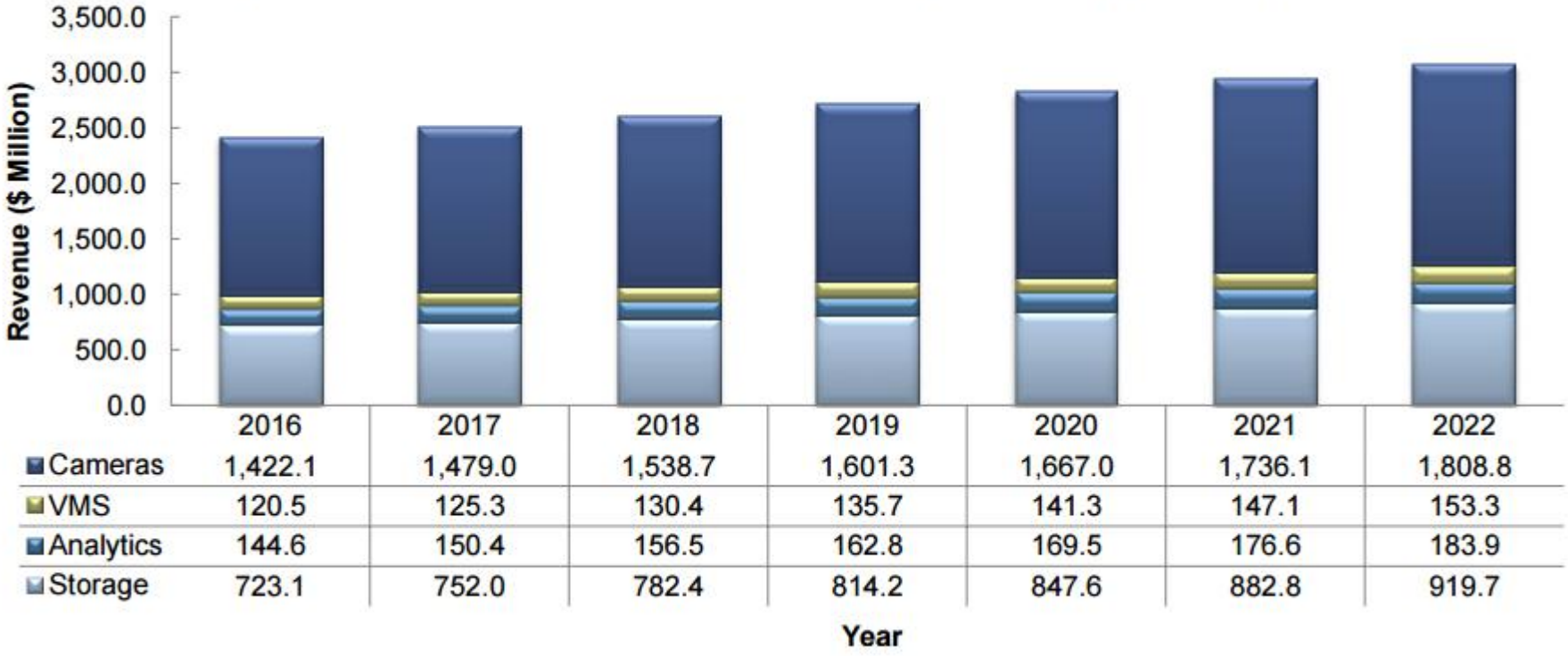


Source: Frost & Sullivan Analysis

Global Market by Type of Products

Cameras will dominate market spending, primarily owing to the increase in digitisation and enhanced capabilities of cameras to perform under challenging environments coupled with their decreasing costs. This will also lead to a steady increase in spending on storage as increased surveillance is directly related to better management of data.

Total City Surveillance Market: Revenue Forecast by Product Type, Global, 2016–2022



	2016	2017	2018	2019	2020	2021	2022
Cameras	1,422.1	1,479.0	1,538.7	1,601.3	1,667.0	1,736.1	1,808.8
VMS	120.5	125.3	130.4	135.7	141.3	147.1	153.3
Analytics	144.6	150.4	156.5	162.8	169.5	176.6	183.9
Storage	723.1	752.0	782.4	814.2	847.6	882.8	919.7

Source: Frost & Sullivan Analysis

Global Market Scenario by Regions

China would be the most dominant country with approximately 58% share by 2022, primarily owing to the country's existing advanced infrastructure and the nationwide initiative "Skynet" to boost overall security. Middle East and APAC are expected to witness the highest growth owing to lower penetration in these regions.

Total City Surveillance Market: Revenue Forecast by Region, Global, 2016–2022

Year	Africa ($ Million)	APAC ($ Million)	China ($ Million	Central Asia ($ Million)	Middle East ($ Million)	Europe ($ Million)	Latin America ($ Million)	North America ($ Million)
2016	32.0	359.4	1,492.8	19.0	138.5	221.1	73.9	73.7
2017	34.0	384.1	1,538.8	19.2	148.5	230.3	76.5	75.4
2018	36.0	410.6	1,586.3	19.5	159.2	239.9	79.2	77.1
2019	38.3	439.1	1,635.2	19.8	170.8	249.9	82.1	78.8
2020	40.6	469.7	1,685.7	20.1	183.2	260.4	85.0	80.7
2021	43.1	502.7	1,737.7	20.4	196.6	271.4	88.0	82.6
2022	45.8	538.1	1,791.3	20.7	211.0	282.9	91.2	84.6
CAGR (%)	**6.2**	**7.0**	**3.1**	**1.4**	**7.3**	**4.2**	**3.6**	**2.3**

Source: Frost & Sullivan Analysis

Global Market Drivers

Capabilities of intelligent analytics solutions such as anomalous behaviour detection and suspicious object detection in crowded places include identifying suspicious patterns and automatically triggering an alarm to the viewer. This in turn reduces the manual effort of law enforcement personnel significantly.

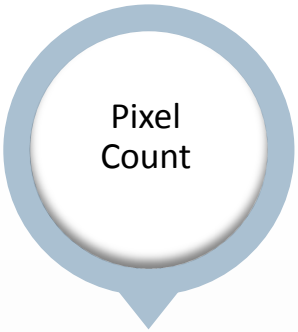
The need for law enforcement officials to have complete situational awareness in real time is absolutely paramount to achieve resourceful situational management. • Surveillance systems equipped with intelligent analytic solutions enable effective planning and deployment.

The growing trend of infrastructure expansion across cities globally is attributed to the adoption of "Smart City" initiatives for ensuring better standards of safety and security provision to the public. This has opened up ample opportunities for the adoption of surveillance systems.

Increased urbanisation in cities creates the need for efficient traffic management. The development of smart traffic management analytic solutions such as parking space analysis, vehicle detection and counter, and license plated recognition enable effective traffic management.

Source: Frost & Sullivan Analysis

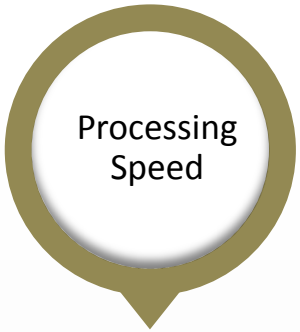
Technology Trends (1/2)



Pixel count is a camera element that continues to evolve in importance, as end users place a greater emphasis on the use of analytics and panoramic view solutions. Whilst 4K resolution cameras offer end users a crisp image, the market for these systems will be restricted by the additional bandwidth and compression issues with respect to the existing surveillance infrastructure.

Wide dynamic range (WDR) capabilities of video cameras are important for law enforcement as there is a need for effective, high-quality recording in environments with a wide range of light conditions, where image clarity is paramount.

The IR capability of thermal cameras to function under intense environmental conditions such as extreme weather and poor lighting conditions on a 24x7 day/night basis offers smart cities the perfect solution for public safety. Law enforcement agencies have increasingly adopted high definition (HD) IP surveillance cameras with advanced pan, tilt, and zoom capabilities.



Processing impacts the speed at which visual information can be understood and transmitted by the camera as well as the video quality. Greater emphasis is being placed by end users on processing speed, especially in cameras where edge analytics are utilised or where pixel requirements are higher.

Source: Frost & Sullivan Analysis

Technology Trends (2/2)

The evolution of mobile and cloud-based VMS solutions has provided users with access to surveillance footage anywhere anytime, greatly reducing the response time whilst providing greater flexibility in critical situations. Continuous improvements in VMS are expected, with cloud-based VMS systems likely to play a much bigger part in public surveillance systems in future.

Automated number plate recognition technology, facial recognition, parking space analysis, traffic management, metadata searching, object detection and identification, crowd behaviour detection are some of the video analytics requirements which will foresee technology advancements in future.

Installation and type of cameras depend on the urban environment and the surrounding. Whilst surface, recessed, and parapet installations favour the use of dome cameras, wall and pole installations are more suitable for fixed box. It is expected that there would be innovation in the design of cameras to make them highly effective across different settings.

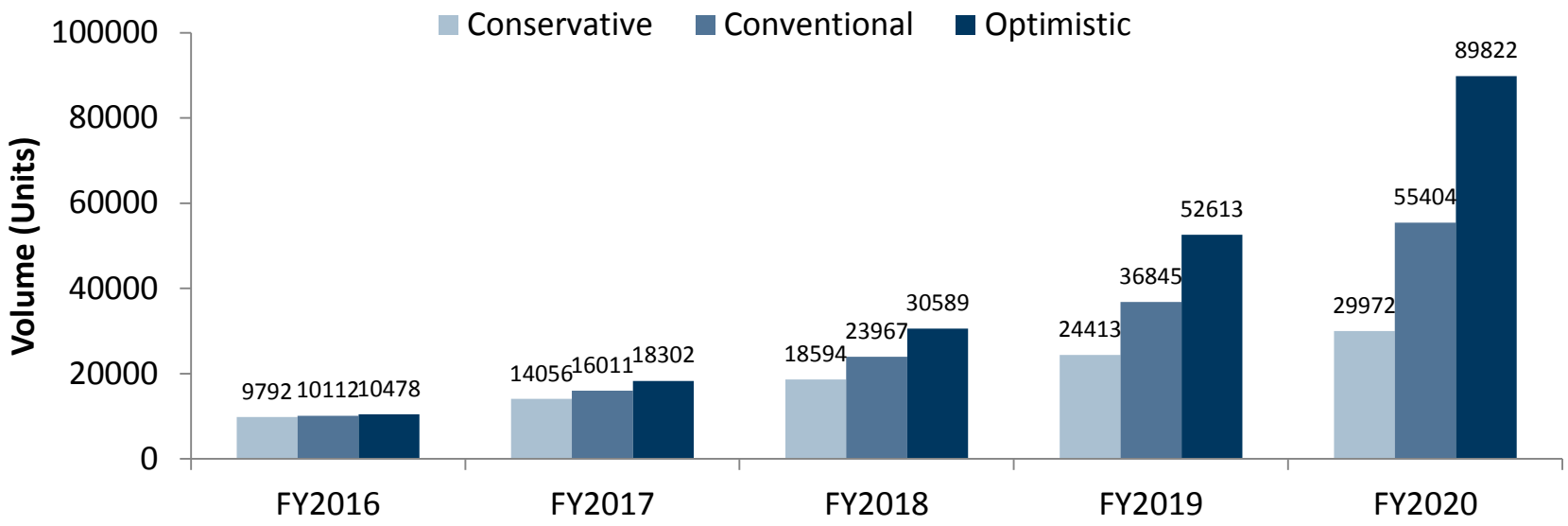
A steady rise in the number of analytics solutions and the increased adoption of high-definition surveillance cameras drive the need for larger capacity and more efficient storage systems to accommodate large volumes of data.
The transition to more scalable and robust storage solutions is therefore absolutely critical.

Source: Frost & Sullivan Analysis

Indian Market Landscape

Emergence of smart cities in India with focus to develop 100 smart cities by the government of India coupled with growing interest in video analytics and high-resolution imaging will drive the market in India. Improvement in the ICT infrastructure and the availability of robust and reliable bandwidth in the country are expected to spur adoption across segments.

Surveillance Camera Volumes by Scenarios (FY2016 to FY2020)



Source: Frost & Sullivan Analysis

Indian Market Dynamics

Smart Cities

Investments of about $1.2 trillion will be required over the next 20 years across areas such as transportation, energy, and public security to build smart cities in India. Under the “Safe City” project, the Union Ministry proposes $333 million for security and surveillance in 7 big cities.

IP Based Surveillance

In India analog-based surveillance systems have accounted for majority share. However, IP based surveillance systems are expected to increase in the next five years due to increasing IP infrastructure, declining prices, and demand for remote access.

Cloud-based Surveillance

Cloud technologies and cloud based surveillance is a key driver for IP technology adoption in India. Increased awareness about the benefits of these solutions, including remote monitoring, encouraging ROI, reliability will drive the market.

Security Data Storage

Data management is going to be critical for government bodies and organizations and it is imperative to create the supporting infrastructure to house, protect, and analyse massive video data sets in a secured manner.

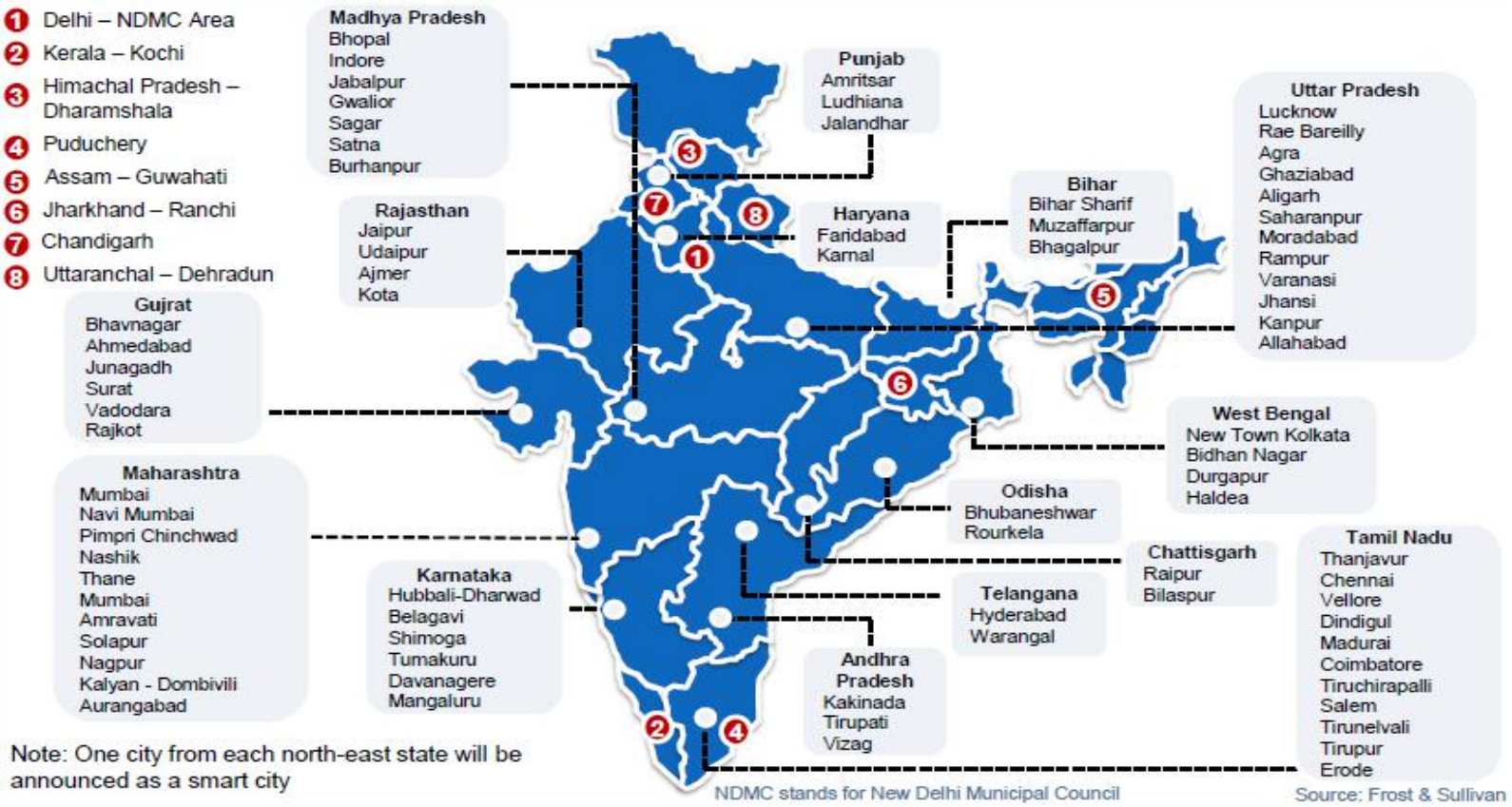
Untapped SME Market

Huge opportunity for electronic security system will emerge from Small Office Home Office (SOHO) and Small and Medium Enterprise (SME) markets across India. The home and office security system market in India is growing at 25 to 30 per cent annually.

Source: Frost & Sullivan Analysis

Smart Cities in India

The Union Cabinet had approved a budget of INR 48,000 Cr. for the 100 Smart Cities mission announced in June 2015. In the current budget INR 9,000 Cr is reserved for Smart Cities and AMRUT Mission, as against INR 7,296 Cr. in the last Budget. This translates to a large opportunity (3-5 per cent) of the total budget in the surveillance sector for the different security players in the market



Infrastructure Development in India

Various projects have been planned by the Indian government under the umbrella of infrastructure development initiatives across road, railways, airport and urban development which will further boost the overall demand in the surveillance industry and create opportunities for growth.

- **Railway expenditure allocation of INR 1,31,000 Cr. for laying down 3,500 km of railway lines in 2017-18**
- **A $5 billion Railways of India Development Fund (RIDF) was set up, which will serve as an institutional mechanism for the Railways to arrange funds from the market to finance various infrastructure projects**

- **The Government of India plans to build 8,000 km of pavements and lay more cycle tracks in 106 cities in the next 5 years with an investment of INR 80,000 Cr**
- **The monetisation of 75 publicly funded highway projects of value INR 35,600 Cr via toll-operate-transfer (TOT) mode will fetch adequate funds to finance road construction of 2,700 km length of roads**

- **Airports Authority of India plans to increase its capital expenditure for 2017-18 by 25 per cent to INR 2,500 Cr primarily to expand capacity at 12 airports to accommodate increase air traffic**
- **AAI plans to develop city-side infrastructure at 13 regional airports across India, with help from private players for building of hotels, car parks and other facilities, to boost its non-aeronautical revenue**

- **The Ministry Of Urban Development has approved investment of INR 2,863 Cr in six states under the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) scheme over FY 2017-20**
- **The Government of India and the Asian Development Bank have signed $375 million in loans and grants for developing 800 km Visakhapatnam-Chennai Industrial Corridor**

Key City Surveillance Projects in India

Axis Communications has deployed safe city solutions in cities such as Bhavnagar, Kolhapur, Aurangabad and Nanded. It has also been a preferred partner in projects such as DY Patil Stadium in Mumbai, Hyderabad International Airport, City Surveillance Project in Kolkata, Shivajinagar Bus Terminus in Bangalore to name a few.

Mumbai	In 2015, Maharashtra government signed a MoU of INR 949 Cr with engineering and construction major Larsen & Toubro (L&T) for bringing Mumbai under CCTV surveillance with 6,000 cameras to accomplish the objective of upgrading the security and check the crime and terror activities.
Surat	Verint Systems in association with the Safe City Project initiated by the Surat City Police Department and Surat Traffic Education installed more than 100 CCTV cameras to provide 24x7 video surveillance and security command centre in 2013.
Bhubaneshwar	In 2015, Honeywell bagged a contract under Bhubaneswar's smart city project to set-up integrated closed-circuit television cameras (CCTV), automatic number plate reading cameras (ANPR), and a command and control centre covering more than 350 CCTV cameras installed at 90 locations.
Ujjain	Honeywell concluded a city-wide installation for Madhya Pradesh Police Department's to help them in crime prevention, traffic, and crowd management during the Simhastha Kumbh in 2016. As part of the project, 667 video cameras were installed for the Simhastha Kumbh event at the Mahakaal Temple, and at 134 locations around the city.
Nagpur	L&T's Smart World Communications along with Maharashtra government will cover laying of 1,200 km of optical fiber network backbone, creating 136 City Wi-Fi hotspots at key locations, establishing 100 digital interactive kiosks and developing city surveillance systems with 3,800 IP based cameras.

Competition Mapping

Competition is intense in the overall surveillance industry in India, with certain players providing complete solutions as system integrators while other players focusing only on providing the core camera solutions for the projects.