creating smart infrastructure
Larsen & Toubro is a major Indian multinational in technology, engineering, construction, manufacturing and financial services, with global operations. Its products and systems are marketed in over 30 countries worldwide. A strong, customer-focused approach and the constant quest for top-class quality have enabled L&T to attain and sustain leadership in its major lines of business across eighty years.

- Construction
- Heavy Engineering
- Hydrocarbon Engineering
- Power
- Metallurgical & Material Handling
- Ship Building
- Infrastructure Concession
- Realty
- Electrical & Automation
- Construction & Mining Machinery
- Valves
- Infotech
- Technology Services
- Financial Services

L&T Construction, India's largest construction organization and ranked among the world's top 30 contractors, has been over the past seven decades transforming cityscapes and landscapes with structures of immense size and grandeur. The company's capabilities span the entire gamut of construction - civil, mechanical, electrical and instrumentation engineering - and its services extend to all core sector industries and infrastructure projects.

Several of the country's prized landmarks - edifices, structures, airports, industrial projects, flyovers, viaducts, water and power infrastructure projects carry L&T's signature of excellence in construction. Today, more and more structures beyond India's boundaries are standing tall, thanks to L&T Construction.

L&T Construction straddles seven related businesses:
- Buildings & Factories
- Transportation Infrastructure
- Heavy Civil Infrastructure
- Power Transmission & Distribution
- Water & Effluent Treatment
- Smart World & Communication
- Renewable Energy

Building landmarks, setting benchmarks *

- 407 high rise towers
- 11 airports
- 53 IT parks
- 56 manufacturing facilities
- 45 hospitals
- 306 km of metro rail corridors
- 19.5 km of monorail corridor
- 8315 MW of hydro power projects
- 8080 MW of nuclear power projects
- 21700 lane km of highways
- 7.61 million sq.m of runways
- 4923 tkm of railway track laying
- 16035 tkm of railway electrification
- 720 substations
- 32150 MW of E-BoP
- 29000 ckm of transmission lines
- 1 lakh + km of water & waste water networks
- 5900 MLD of water & waste water treatment plants
- 1 GW of solar plants
- India's largest city surveillance project: 6000 cameras at 1500 locations at Mumbai

*The track record information published here is as of July 2018
Increasingly, the world is seeking smarter, secure, more intelligent solutions and optimized utilization of resources to enhance quality of life which has led to the rise of smart cities and advanced security solutions and communication infrastructure in several advanced economies.

India is also rapidly gearing up to create smart infrastructure that will soon be the backbone of the economy. With the mandate to build smart cities at the top of the Government's priority list, this area is abound with huge opportunities in the near future. The potential business opportunities are in the areas of city surveillance, intelligent traffic management systems, transport & logistics, OFC cabling, communication network including backbone (GOFNMS, DWDMS, IPMPLS etc.), telecom infrastructure, BMS, smart grids, smart governance & education and smart city development. The need is to effectively tap the specific requirements of a wide range of customers including Central and State governments, railways, airports, seaports, expressways, defence, transport & logistics providers, telecommunication service providers, IT companies and residential building/city developers in a focused manner.

From L&T's perspective, the good news is that these resulting opportunities can be tapped by various businesses within the L&T Group. With a successful track-record complemented by domain knowledge across business verticals, L&T is well positioned to be a key Master Systems Integrator (MSI) for smart city projects. The Smart World & Communication Business Unit (SW&C BU) in L&T Construction leads all business initiatives in this realm and collaborates with L&T Infotech, L&T Electrical & Automation Independent Company and L&T Technology Services to provide end-to-end solutions to customers under the following segments:

**GETTING SMARTER FOR A SMART WORLD**

**THE L&T ADVANTAGE**

- Global expertise
- Project management
- Master systems integration
- State-of-the-art IT capabilities
- Software, analytical & mobility
- Hardware services
- Strategic partnerships

**SMART INFRASTRUCTURE**

**SMART COMMUNICATION NETWORK AND TELECOM INFRASTRUCTURE**

**SMART SECURITY SOLUTIONS**

for complete spectrum of solutions
SMART SYSTEMS INTEGRATION FOR IMPROVED QUALITY OF LIFE & SUSTAINABILITY

Several of these systems have been executed by L&T Construction in various projects across the country. Recently, L&T Construction has commissioned the prestigious project for the Home Department, Gujarat by installing City Surveillance & Intelligent Traffic Management Systems for three cities in Gujarat – Ahmedabad, Gandhinagar and Vadodara. Another unique project facilitating better surveillance and management of critical infrastructure at Sabarmati Jail in Gujarat has been executed too.

The BU is currently executing India’s largest city surveillance project comprising 6000 cameras over 1500 locations at Mumbai City.

A pilot smart-city in the campus incorporating features like surveillance, access control systems, video analytics and emergency response systems is being set up at the 27-acre campus of L&T Construction in Chennai.
L&T has proven its expertise in providing state-of-the-art systems for city surveillance and its core strength lies in the extensive use of technology in exciting new applications like video management systems, video and audio analytics, picture intelligence units and Geographical Information Systems (GIS).

Comprehensive "concept-to-commissioning" offerings include:

- Surveillance Equipment
- Network
- Data Centers
- Application Portfolio
- Command / Viewing Centers
- Picture Intelligence Units
- Vehicle Tracking Systems
- Emergency Call Box (ECB)
- Meteorological Systems (MET)
- Flood Level Monitoring Systems
- Public Announcements
- Collaborative Monitoring
- Help Desk and Facility Management Services
- E-portal services for citizen friendly services

The burgeoning increase in road traffic calls for intelligent transport solutions designed to reduce traffic congestions, improve incident response time, optimize traffic flow and proactively manage traffic conditions. L&T specializes in creating smart solutions and systems to monitor, analyze and even predict traffic patterns by leveraging data from multi-faceted traffic management sources.

Offerings include:

- Automatic Number Plate Recognition Systems (ANPR)
- Red Light Violation Detection Systems (RLVD)
- E-challans
- Automatic Traffic Counter cum Classifiers (ATCC)
- Automated Vehicle Locating Systems (AVLS)
- Variable Message Signs (VMS)
- Vehicle Scheduling and Dispatching Systems
- Parking Availability Systems
- Passenger Information Systems
- Depot Management Systems
- Automated Fare Collection Systems
- Enterprise Management Systems
- Emergency Call Boxes (ECB)

City Surveillance

Intelligent Traffic Management Systems

A typical schematic of an Intelligent Traffic Management System

ANPR / RLVD ECB CCTV ATCC MET VMS E-challan

*ANPR - Automatic Number Plate Recognition System
*RLVD - Red Light Violation Detection System
*ECB - Emergency Call Box
*ATCC - Automatic Traffic Counter cum Classifier
*MET - Meteorological System
*VMS - Variable Message Sign

Data Center

Traffic control command center
For a more secure and smarter world, a robust communication network and telecom infrastructure is an imperative. L&T Construction has the capability to provide end to end solutions for a range of requirements covering Wired & Wireless Networks including OFC; IP-based DWDM Communication Network; GSM services; Wi-Fi; Fixed Broad Band; Satellite and Microwave RF Links; ICT / Data Centre Infrastructure; Multimedia Services & Gateways.

L&T Construction has considerable experience in laying more than 20,000 km of underground optical fiber cabling across the length and breadth of the country including the installation of more than 10,000 km of optical ground wire (OPGW) hot line stringing on transmission line towers. It is currently executing 17,500 km of OFC networks as part of the NFS roll out in the southern and western regions of India. The BU has an excellent track record of installing telecom towers and other associated works on a turnkey basis. The Communication segment has already proven its expertise in providing state-of-the-art IT & communication systems for airports, metros, power plants and factories including the ongoing TETRA communication system for Delhi Metro, Dubai Concourse 4 Special Airport Systems Package and AFINET.

**Fiber Deployment & Management Systems**

Fiber Optic is the emerging technology to meet the growing bandwidth of demand and reliability of network. With the thrust on better uptime and SLA, operators need to have a real time system for maintaining the health and availability of the fiber network. L&T offers specialized turnkey GIS-based network management solutions for a complete view of the Network on the GIS corridor and tools for real time monitoring, detection and restoration of faults as well as updating of ISP and OSP data to meet time-bound SLA for the network.

Comprehensive offerings include:

- Deployment of Fiber Optic Network
- Fiber Distribution Management Systems
- Network Testing & Monitoring
- Intrusion Detection Systems
- GIS-based Optical Fiber Network Management Systems (GOFNMS)

**GSM/Satellite/Microwave Radio Networks**

L&T offers a spectrum of solutions for wireless technologies covering satellite communication, terrestrial communication through microwaves and global systems.

Turnkey offerings include:

- Satellite Communication Network with hub and remote stations
- Transportable Satellite Communication (TST) stations
- Ground based / Roof Top Towers, Poles
- Radio Network, IDU and ODU, frequency/space diversity
IP-MPLS/NGN Network

L&T, in collaboration with various OEMs, offers integrated time-bound multi-location network implementation for IP/MPLS networks to enable guaranteed network latency, quality of service flexibility in network deployment and improved routing system scalability.

Offerings include:
• Deployment of Converged IP/MPLS Backbone
• Datacenter Switching Network
• NOC / DR NDC

Fixed/Wireless Broadband Access Networks

Over the years, the demand for Wi-Fi and similar other wireless technologies have risen in terms of coverage, capacity, performance, quality, and manageability allowing service providers to establish wireless mesh networks. L&T is equipped to provide customized solutions that can be scaled-up based on a customer's utility.

Solutions offered include:
• Campus based Wi-Fi services
• City Wi-Fi networks
• Public Wi-Fi hot spots

Optical Transport Solutions

Optical Transport Technologies enable high speed multimedia applications with utilization of fiber capacity as emerging solutions. L&T offers end-to-end system integration solutions in this domain covering:
• Optical Transport Network (OTN) equipment
• Dense Wavelength Division Multiplexing (DWDM) solutions
• Gigabit Passive Optical Network (GPON)
• SONET/SDH Based Network solutions
• Automatic Optical Switching Layers
L&T offers multi-pronged security solutions on a turnkey basis that are postmodern and reliable for a whole spectrum of smart infrastructure which covers Smart Buildings, Smart Energy, Smart Water Solutions, Smart Transportation & Logistics, Emergency Response Systems, Real-time Information Systems, ICT Solutions, Fixed Wireless & Broadband Communication Backbone.

L&T Construction has executed many projects that include most of the sub-systems of SMART city offerings like CCTV systems, VMS, Video Analytics, Access Control Systems, Telecom Systems, Command & Control Centre Systems - DIAL, MIAL, Cairn Energy, KAFCO to name a few. These projects, which were executed independently till now, are now being brought under one umbrella to create smart infrastructure in future.
Smart Buildings
Smart buildings employ communication and automation technologies to integrate various building subsystems, which typically operate in silos otherwise. These sub-systems including HVAC, Lighting, Fire Protection, Access Control Systems, Surveillance, Smart Meters, Water, UPS, Elevators, etc. share information to optimize the performance of the building. A smart building is in sync with smart grids which enables it to optimize its energy requirements.

With an experience spanning over 500 buildings including high-rise towers, hospitals, commercials complexes, IT Parks and factories, L&T is the largest building construction company in India. In addition, L&T has also invested in creating a unique Building and Energy Management System – iBEMS which integrates several technologies to provide measurable benefits to customers in addition to providing a solid base towards getting certifications like LEED. iBEMS provides event-based data retrieval for real time data access (data analytics, reports, 3D visualization) along with historic data support and has a user-friendly interface.

Smart Critical Infrastructure
L&T’s comprehensive smart technology offerings for critical infrastructure covering nuclear power plants, metros, IT parks and airports straddle:
• Surveillance Equipment
• Access Control Systems
• Intrusion Detection Systems - Perimeter/Pipeline
• Public Address Systems
• Integrated Command Control Centres
• Video Management Systems
• Video Analytics
• Network Infrastructure
• Specialized Solutions
• Public WiFi
• Information Displays
• Tetra Communications
• ELV and Special Systems
Smart Transport & Logistics

Smart cities demand on-call emergency response systems that incorporate modern technologies such as Computer Aided Dispatch (CAD), Geographical Information Systems (GIS), Automated Vehicle Location Systems and Computer Telephony Integration to provide uniform and prompt response to citizens during emergencies.

L&T’s end-to-end offerings include:

- Call Centers
- Contact Center Components
- CAD Applications
- Fleet Management
- Vehicle Tracking Systems

L&T has forged two partnerships with Cisco and Tele2 to provide world-class solutions for the transportation sector including rail, bus and airports.

Transport & Logistics integrated with Dial 100

Smart Water Solutions

A key contributor towards the critical cause of water sustainability, L&T is a market leader in offering ‘concept-to-commissioning’ services for creating world-class water infrastructure in the areas of:

- Water transmission, treatment, distribution and management
- Municipal used water collection, treatment and reuse
- Industrial water treatment to achieve ultra-pure water
- Industrial effluent treatment and zero liquid discharge / recycle
- Desalination Plants - sea water / brackish water
- “Unaccounted for Water” projects to monitor the water loss
- Water Meters
- SCADA - water supply monitoring and distribution management
L&T offers customized solutions from concept to commissioning for micro grids which are integrated energy system networks consisting of distributed generation sources (like solar, micro-wind turbines, fossil fuels and biomass), energy storage and advanced control systems for distribution. Solutions are offered after careful analysis of source and load controls to operate as a single autonomous grid either in parallel or exclusive island set-up from the existing utility power grid.

The benefits of smart grids are reduced outages and faults, flexible distribution of power, smart metering management and demand response and reduction in T&D losses. By enabling intelligent flow of information, smart grids optimize regulation, generation, supply and consumption of electricity. L&T’s smart grid solutions include smart meters, digital sensors, advanced communication networks, sophisticated analytics, sub-station monitoring for power utilities and also predictive analytics to enhance distribution efficiencies.

To showcase its capabilities in renewable energy technology, L&T Construction has commissioned a fully operational micro-grid system at its Chennai campus which integrates solar plant, micro-wind turbine, power generators and grid power to optimize the power requirements.