

# Proposed Solution for “Smart Cities”

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## 1. Introduction

This Smart Cities proposal briefs about the concept of the smart cities and their requirement in today's growing India, requirement of Videowalls in the smart cities and its vital role in today's security and surveillance scenario, what is Videowall technology with its requirement in Command & Control with various application, Delta suggested command center with solution and its reference.

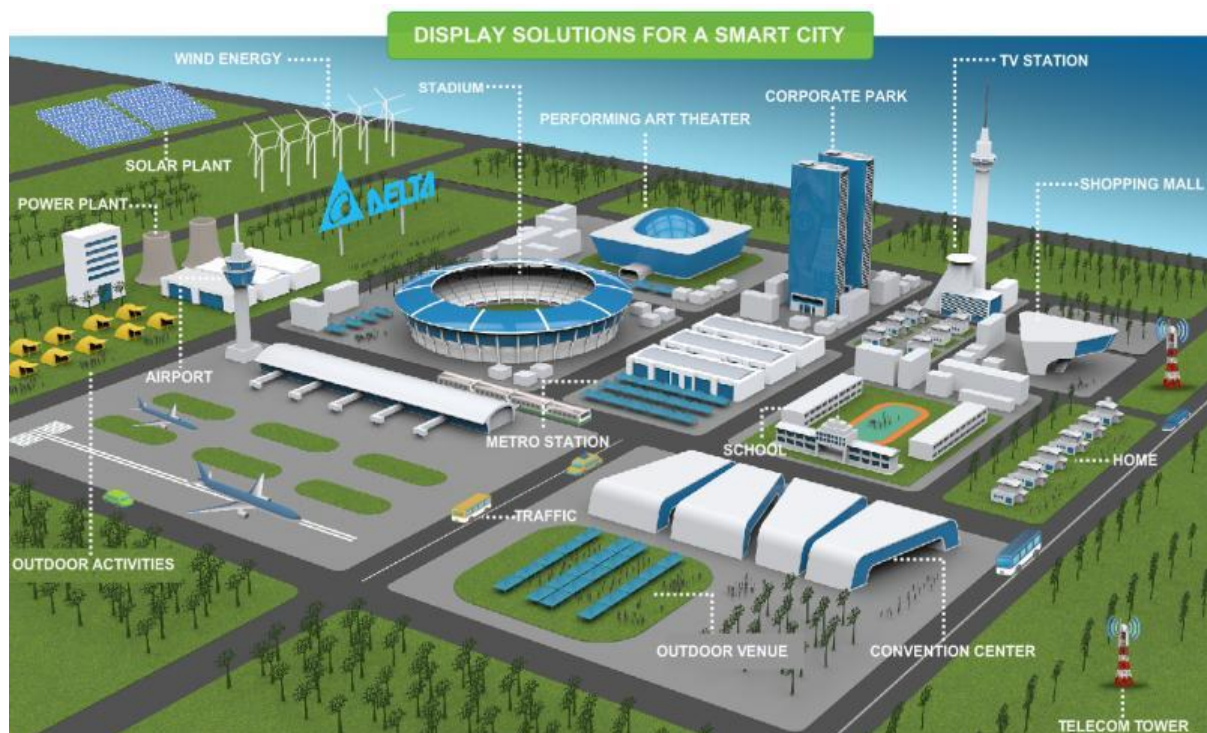


This proposal is designed keeping in mind various upcoming smart cities in our country and how the visual technology will be crucial in monitor the entire city with the blink-of-an-eye to keep our cities safe and protected.

## 2. Purpose

The primary objective of this document is to project the need of the Display Wall for a smart city and what type of Videowall shall be operational in accordance to the requirements for a Smart City.

This proposal document encompasses the requirement of Videowall in smart cities, Videowall technology, command and control with various applications and the suggestive control room by Delta.





### 3. Smart Cities

Smart Cities Mission is an urban renewal and retrofitting program by the Government of India with a mission to develop 100 cities all over the country making them citizen friendly and sustainable. The Union Ministry of Urban Development is responsible for implementing the mission in collaboration with the state governments of the respective cities. The government of India under Prime Minister Narendra Modi has a vision of developing 100 smart cities as satellite towns of larger cities and by modernizing the existing mid-sized cities.

The 100 potential smart cities were nominated by all the states and union territories based on Stage 1 criteria, prepared smart city plans which were evaluated in stage 2 of the competition for prioritizing cities for financing. In the first round of this stage, 20 top scorers were chosen for financing during 2015-16. The remaining will be asked to make up the deficiencies identified by the Apex Committee in the Ministry of Urban Development for participation in the next two rounds of competition. 40 cities each will be selected for financing during the next rounds of competition.

#### 3.1 Attributes

Smart cities are projected to be equipped with basic infrastructure will, offer a good quality of life through smart solutions. Assured water and power supply, sanitation and solid waste management, efficient urban mobility and public transport, robust IT connectivity, e-governance and citizen participation along with safety of its citizens are some of the likely attributes of these smart cities.

#### 3.2 Finance

A total of ₹980 billion (US\$15 billion) has been approved by the Indian Cabinet for development of 100 smart cities and rejuvenation of 500 others. For the smart cities mission, ₹480 billion (US\$7.1 billion) and for the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), a total funding of ₹500 billion (US\$7.4 billion) has been approved by the Cabinet.

In 2014 Union budget of India, Finance Minister Arun Jaitley allocated ₹70.16 billion (US\$1.0 billion) for the 100 smart cities. However, only ₹9.24 billion (US\$140 million) could be spent out of the allocated amount till February 2015. Hence, the 2015 Union budget of India allocated only ₹1.43 billion (US\$21 million) for the project.

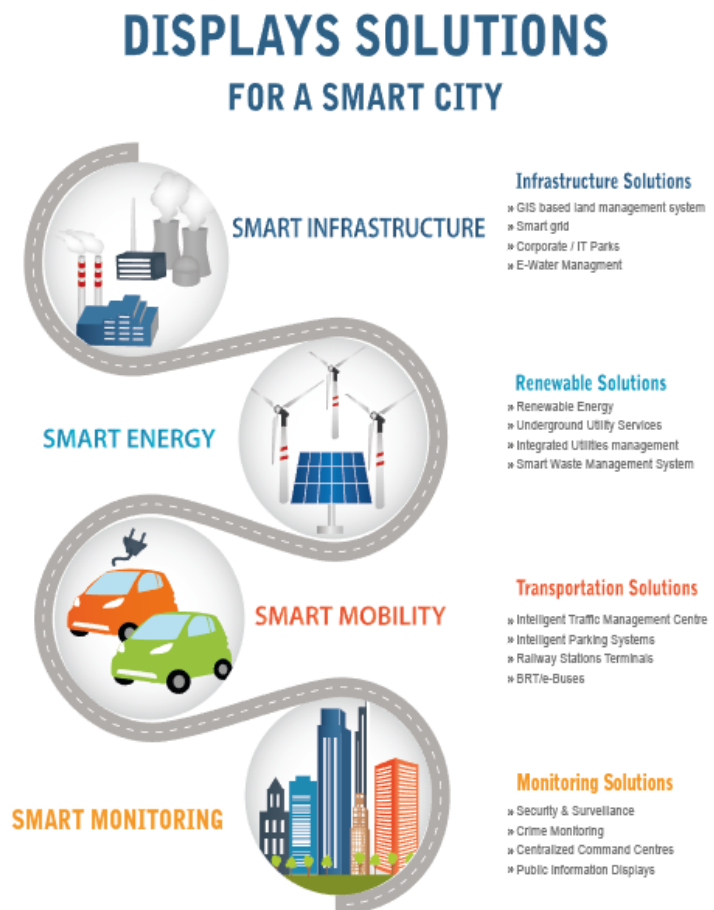
First batch of 20 cities selected in the second stage of competition will be provided with central assistance of ₹2 billion (US\$30 million) each during this financial year followed by ₹1 billion (US\$15 million) per year during the next three years. The remaining money has to come from the states, urban bodies and the consortium that they form with corporate entities. Also, 10 per cent of budget allocation will be given to states / union territories as incentive based on achievement of reforms during the previous year.

Urban Development Ministry had earlier released ₹2 crore (US\$300,000) each to mission cities for preparation of Smart City Plans.

## 4. Display Solutions (Videowall) in Smart Cities

A city can't be smart if it isn't safe. While a "smart city" may mean different to different people, one thing everyone will agree on is that smart cities use digital technologies to improve the quality of life of the people who live in them, reduce environmental impact, and make everyday services run smoothly. Another thing is that a safe city is the first step toward a smart city. Hence, to make a smart city complete there is a need to enhance the safety and security of it as most of the cities in our country have large population and are very vulnerable when it comes to safety and security.

To meet these requirements city surveillance projects are becoming a necessity in all smart cities projects as there is a need to ensure safety of the public by monitoring each part of the city. So that's one reason protecting the citizens with a network video solution and to monitor the entire network video there is a need of highly flexible and scalable Central Command and Control room equipped with High-end Large Videowall solutions to monitor minute details with convenience. The Video surveillance system equipped with Videowall will help in proactively addressing any terror threat, effective traffic management and to improve safety of the city.



## 5. Video Wall Technology

A Videowall is formed by grouping multiple "rear-projection display cubes" and arranging them next to one another in a matrix (ex: forming a 2×2 or 3×3 shape) and making all these individual cubes to behave as a single logical screen so that the image looks very big and appears to come from a single display source. Video walls are required to form a single huge display source which can provide high resolution, high contrast and uniform brightness. A Videowall is formed by the combination of the following three technologies.



### **5.1 Rear-Projection Display Cubes:**

The basic display element of a Videowall (which can also operate individually) is a display cube. The display cube is built with a rear projection DLP projector (normally) and a screen to show the output. The display cube may be supported by adjustable stands and can be arranged next to each other or over one another without the viewer knowing that there is a boundary between any two of them.

These DLP projectors normally have a very high contrast ratio which helps in the projection of minute objects accurately. They also control the brightness uniformly across the screen for good viewing experience. They generally support multiple resolutions from XGA, SXGA+ & Full HD. Typical display cube sizes range from 50" to 80" diagonal. Some of them offer 4:3 aspect and some of them offer 16:9 aspect.

There are generally two type of light source used in the display cubes UHP & LED but Delta being a pioneer in display technology have introduced laser lit display cubes to add third type of light source in the series.

### **5.2 Video Wall Control System:**

The Videowall controller is basically a hardware computer server running a network operating system like Windows etc. They are designed for 24 x 7 operations and accept inputs from various sources like cameras, satellite imagery, video recorders, DVD/VCR players, computers etc. and support a wide range of input formats like multiple RGB input, video, BNC connectors, HD, DVI etc. They also support expansion for additional input like HD-SDI and PCI-x based expansion.

### **5.3 Video Wall Management Software:**

Video wall management software is used to manage and control the display content from a wide range of input sources. With the wall management s/w, windows on the Videowall can be opened, placed, moved and sized. Layouts can be saved and recalled.

### **5.4 DLP® Technology:**

Delta rear projection video walls are powered by Digital Light Processing (DLP™) technology. Generating extraordinary image quality with incredible color depth and contrast, DLP™

technology brings video images to life and enables detailed data to be read with ease – extremely important factors in a control room environment.

### 2 million hinge-mounted microscopic mirrors

At the heart of a DLP™ Videowall is the DMD chip which contains an array of up to 2 million hinge-mounted microscopic mirrors. Each mirror can switch on and off up to several thousand times a second enabling it to reflect up to 1,024 shades of grey and create up to 35 trillion colors.

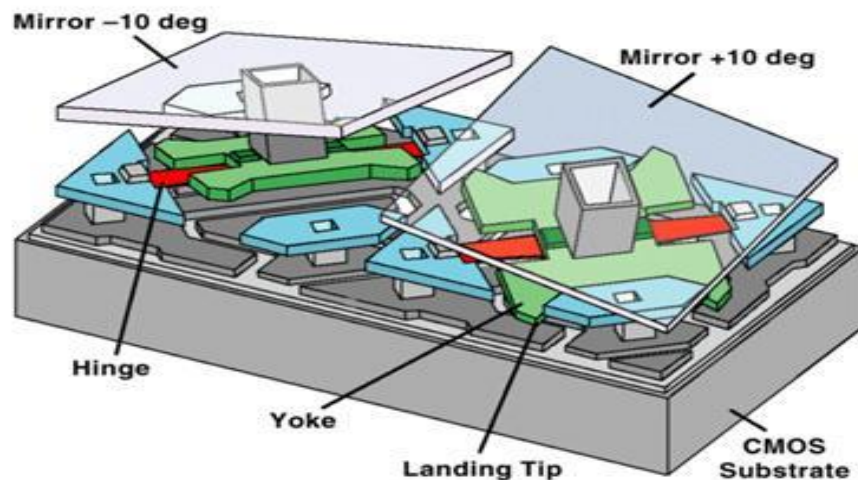


Figure1: The Digital Micromirror Device (DMD) chip. Showing mirror in tipped position.

A DLP™ subsystem consists of a light source, optics, color filters, digital processing and formatting, a DMD, and a projection lens.

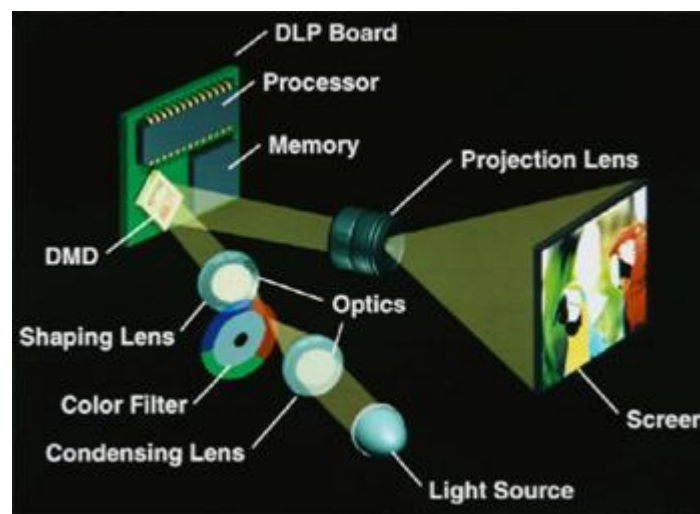


Figure 2: Field sequential color method which enables a single DMD device to show a color image.



Boasting high Contrast ratios, (upto1,500,000:1) DLP™ technology delivers crisp, sharp whites and deep dark blacks producing 3D-like images that almost pop out of the screen.

### **Renowned for long term reliability**

DLP™ technology is also renowned for its robustness and long term reliability. Today, lifetime estimates for a DLP™ chip exceed 100,000 operating hours and more than 1 trillion mirror cycles. DLP™ technology is robust mechanically, electrically and environmentally.

DLP® Video walls are an ideal choice of many control room operators for their reliability, performance and long life in mission-critical applications like traffic control rooms, Power control rooms, Utility control centres, and disaster management centres.

## **5.5 Laser DLP Video Wall**

### **5.5.1 Benefits**

**Better Image Quality:** Laser light source ensures bright & sharp images over life time of the display.

**Higher Efficiency:** High Lumens/ watt ratio gives you more for less.

**Virtually No Operating Expenditure for Over 5 years:** high Operating life and High MTBF ensure almost no operating expenditure.

**Increased Productivity:** Low MTTR provides highest uptime to increase overall productivity. Bright display helps to reduce operator Fatigue

### **Advantage of LASER DLP Technology:**

- Laser Lit
- Intelli-Sense
- Ultra-High Brightness
- Monitoring & Diagnostics
- IP6X Certified

### **5.5.2 Key Components:**

#### **5.5.2.1 Laser Light source**



Each display is equipped with multiple laser banks which work in tandem while also providing redundancy. Each laser bank is populated with an array of Laser diodes. This results in the Brightest DLP Display which exceeds appx. 2150 Lumens which is almost 2 times of any other light source for Video Walls. This helps to achieves  $\geq 98\%$

#### **5.5.2.2 Intelli-Sense**

Intelli- sense is an in-built unique and intelligent auto correction system to ensure enhanced system performance and long life without external intervention.

The Intelli-sense monitors various parameters of the system (Ambient Temperature, Humidity, Internal temperature, Brightness, light source status, cooling mechanism, power etc) and automatically performs real time self-corrections to deliver the best performance and reliability needed for a 24x7 system.

This feature also notifies defined users about system alarms via an active monitoring interface. All the actions performed by Intelli- sense can also be observed using the active monitoring interface.

#### **5.5.2.3 True Redundancy**

Laser DLP Videowall ensures high levels of redundancy at all levels to ensure the highest Uptime in a 24x7 operating environment. Light Source Redundancy: Laser light source works in tandem to ensure no image loss/ blank screen due to failure of any laser module.

Power Supply Redundancy: Laser cubes have an option of Hot Swappable and redundant power supplies which ensure high transfer efficiency and reduced power consumption as compared to standard cube.

Display input redundancy ensures that input sources are always connected to the display wall to offer an intervention –free system

#### **5.5.2.4 IP6X Rated Projection Engines**

Standard Cube brightness decays over the operating life due to accumulation of dust particles inside the projection engine. Laser DLP Cubes from Delta are equipped with state-of-the-Art anti-dust design to ensure  $\geq 98\%$  brightness over the complete period of operating life and is industry's only IP 6X Certified Projection system.

## **6. Command & Control Center**

A command center (often called a war room) is a place that is used to provide centralized command. The Command and Control Center enables law enforcement agencies to identify threats to public security and critical infrastructure. It include a wide range of mission-critical tools and applications like Videowall to increase situation awareness and enable field units to deliver a real-time response for any security incident.

### **6.1 Applications**

Following are the applications that are covered and controlled in a command centre:

- Traffic & Surveillance
- Monitoring of smart poles
- Utilities Management (Water, electricity)
- Telecommunications & Network Operations Centers
- Weather / Disaster Management / Emergency response
- Administrative Control Center complimenting E-governance

## 6.2 User Benefits

- Theft prevention
- Increased situation awareness.
- Effective response and event resolution
- Fast incident detection.
- Alarm management
- E-Challan
- Legal evidence



*Figure 3: Delta equipped Surat City Command and Control Room*

## 7. Proposed Videowall Solution for Smart City Command Center

### 7.1 Display

Delta, leader and pioneer in display technology propose Videowall solution with the world's first Laser lit Xtra slim front access Videowall cubes in 12 x 3 matrix (Columns x Rows) having Full HD resolution. The overall resolution of offered 12x3 Videowall shall be 23040 x 3240 pixels. It is equipped with multiple laser banks; each laser bank has an array of diodes. Failure of single/multiple diode/s in a Laser bank does not affect the display of image on the screen. The brightness of each projection engine is min 2000 lumens (850 nits min) with  $\geq 98\%$  brightness uniformity. Dynamic Contrast ratio will be 1000000:1 or more. The cubes are provided with IP based control and with IR remote for quick access as well. Screen gap is  $\leq 0.2$  mm and support minimum 3 layers with a Hard Backing to prevent bulging.

Control BD Input terminals is equipped with 1 x Digital DVI, 1 x HDMI, 1 x Analog RGBHV and 1 x Analog Dsub-15 inputs with 1 x Digital DVI output. The cooling inside each cube is achieved by means of a heat pipe technology.

The Videowall system is able to switch to HDMI input if primary DVI input is not available. System should also automatically switch back to primary DVI input from HDMI input as soon as the primary DVI input is available again. Sensor based auto color adjustment function with facility to switch on or off as per user requirement is also available. The sensor are installed on top of the engine after the projection lens so that the tolerances of all the glass parts may be accounted for before making the auto adjustment.

One of the unique inbuilt feature introduced in the Delta proposed laser lit Videowall is the Intelli- Sense which is used for Self -Correction of the following parameters:

- Internal Temperature
- Ambient Temperature
- Humidity
- Brightness
- Cooling
- Light Source Status
- Should be possible to demonstrate these parameter through active monitoring interface

The offered projection system is designed to meet IEC/ EN-60529 (IP6X standard). Front service offered with  $\leq 460$  mm Depth, 1107 mm width and 623 mm height.

Cube Control & Monitoring is another offered feature with following parameters:

- Videowall should be equipped with a cube control & monitoring system.
- System should be based on Python- Django framework with web browser architecture.
- Should be able to control & monitor individual cube, multiple cubes and multiple video walls.
- Provide videowall status including source, light source, temperature, fan and power information.
- Should provide a virtual remote on the screen to control the videowall.
- Input sources can be scheduled in "daily", "periodically" or "sequentially" mode per user convenience.
- System should have a quick monitor area to access critical functions of the videowall.
- User should be able to add or delete critical functions from quick monitor area.
- Automatically launch alerts, warnings, error popup windows in case there is an error in the system.
- User should be able to define the error messages as informational, serious or warning messages.
- Automatically notify the error to the administrator or user through a pop up window and email.
- Status log file should be downloadable in CSV format as per user convenience.

## **7.2 Control System**

Fully Network Based Controller: Delta's network based solution consists of a set of encoders and decoders which can encode Digital RGB signals and transmit them over the network. The decoders are able to decode these signals and display upto 64 sources per channel. The



decoders have high accuracy frame-sync to enable multiple decoders in a Videowall to form a prefect video wall. It is possible to show any of the input sources or all of the input sources in any position on the wall, in any size and any configuration. The system support automatic format detection for plug and play simplicity. Adding a source or display unit to the system only entail adding an encoder or a decoder. The quantity of encoders is equal to the inputs to the system and the quantity of the decoders is equal to the no of displays in the system in this case for 12x3 videowall the no. of the decoders shall be 36 and no. of encoders shall be decided based on the no. of inputs required to be viewed. The encoder and decoders should meet the minimum specification as follows:

**ENCODER FOR RGB/DVI SIGNALS**

Parameter	Desired Specification
Input	DVI-I Connector with HDCP, Support analog or digital RGB signal
Input Format	Analog RGB with any sync type (composite, separate, sync on green)
Input Pixel Rate	Pixel Rate Up to 165MHz pixel clock
Input Color Depth	Color Depth 24 bits per pixel
Input Channels	Channels 1/2 options
Output	2 Outputs, DVI-I Connector, Support analog or digital RGB signal
Output Format	Analog RGB with any sync type (composite, separate, sync on green)
Output Pixel Rate	Pixel Rate Up to 165MHz pixel clock
OutputColor Depth	Color Depth 24 bits per pixel
Output Channels	Channels 1/2 options
Ethernet	Ethernet Gigabit 1000 BASE-T
Interface	2x RJ-45, Redundant LAN port
Protocols	Protocols DHCP, UDP, RTP/RTCP, TCP/IP
IP Address	IP Address Static IP address, Automatic IP address
MTBF	> 100,000 Hours
Supported Resolutions	Minimum Upto 2048x1200,Support user defined resolution up to 3800x2000
Power Requirement	100-240 VAC
Operation Temperature	Minimum range 0-40 deg. C

**ENCODER FOR HD VIDEO SIGNALS**

Input Type 1	YPbPr (3x BNC-F)
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Input Type 2	HDMI (v1.3, with HDCP)
Format	Upto <a href="#">2048x1080p@23.98/24/25/29.97/30/50/59/94/60Hz</a>
Channel	1
Ethernet	Gigabit 1000 BASE-T
Interface	2x RJ-45, Redundant LAN port
Protocols	DHCP, UDP, RTP/RTCP, TCP/IP
IP Address	Static IP address, Automatic IP address
Video Processing	Support SD/HD Video Input
	Automatic detect input signal information
	Motion Adaptive Deinterlacing with diagonal, support 3:2 pull down
	High tap filter for image scaling
	Max. 60 fps image processing
	MPEG noise reduction (mosquito / block)
	Support 4 free windows at the same time for each channel
	Support specific region of window tailing
	Support windows multicasting

### ENCODER FOR SD VIDEO SIGNALS

Input	Mini-DSUB
	Support 4channel CVBS or S-Video Input
Input Format	PAL: 576i@50Hz
	NTSC: 480i@60Hz
Channel	4
Ethernet	Gigabit 1000 BASE-T Interface
Interface	2x RJ-45, Redundant LAN port
Protocols	DHCP, UDP, RTP/RTCP, TCP/IP
IP Address	Static IP address, Automatic IP address

### DECODER

Output	Analog or Digital RGB output with DVI-I Connector
	Support HDCP
Pixel Clock	Up to 165M

Color Depth	24 bits per pixel
Channel	Channels 1/2 options
Ethernet	Gigabit 1000 BASE-T
Interface	2x RJ-45, Redundant LAN port
Protocols	DHCP, UDP, RTP/RTCP
IP Address	Static IP address, Automatic IP address
Image Processing	Max. 64 free window in one display
	High tap filter for image scaling
	Max. 2048x1200@60 fps image processing
	Accurate synchronization for display wall
	Bezel Compensation
MTBF	Window title with vector texts
	> 100,000 Hours
	Max. output resolution up to 2048x1200@60Hz
Supported Resolutions	
Power Requirement	100-240 VAC
Operation Temperature	Minimum range 0-40 deg. C

#### SERVER SPECIFICATIONS

CPU	Core 2 Duo 2.4G Hz or above
Memory	4 GB or above
Network	2*1 GbE LAN
OS	Windows Server 2008
HDD	SATA 160GB or above

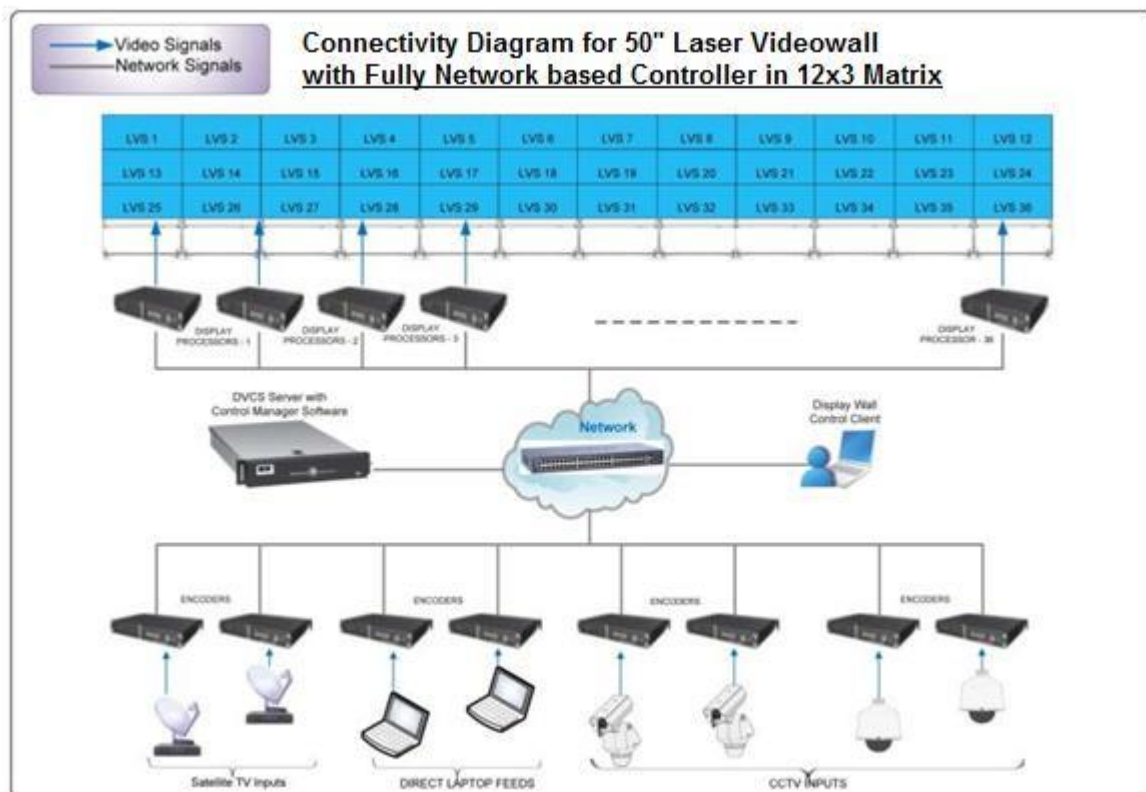
**Wall Management Software:** The architecture of the wall management s/w is browser & server based. User is able to login to the server with Internet Explorer. Hence, there is no need to install any additional software on the control computer. It supports static layout and automatic layout creation, editing, loading, and deleting. Any layout is loaded in under 1 sec (irrespective of size of display & number of windows).

Software is able to manage multiple displays simultaneously including status monitoring, video window control and properties setup. It can also preview video signals before opening window on display wall. The Operator is able to preview the content of video/RGB signal by dragging the signal source into the signal preview window. The system software support 5 RGB

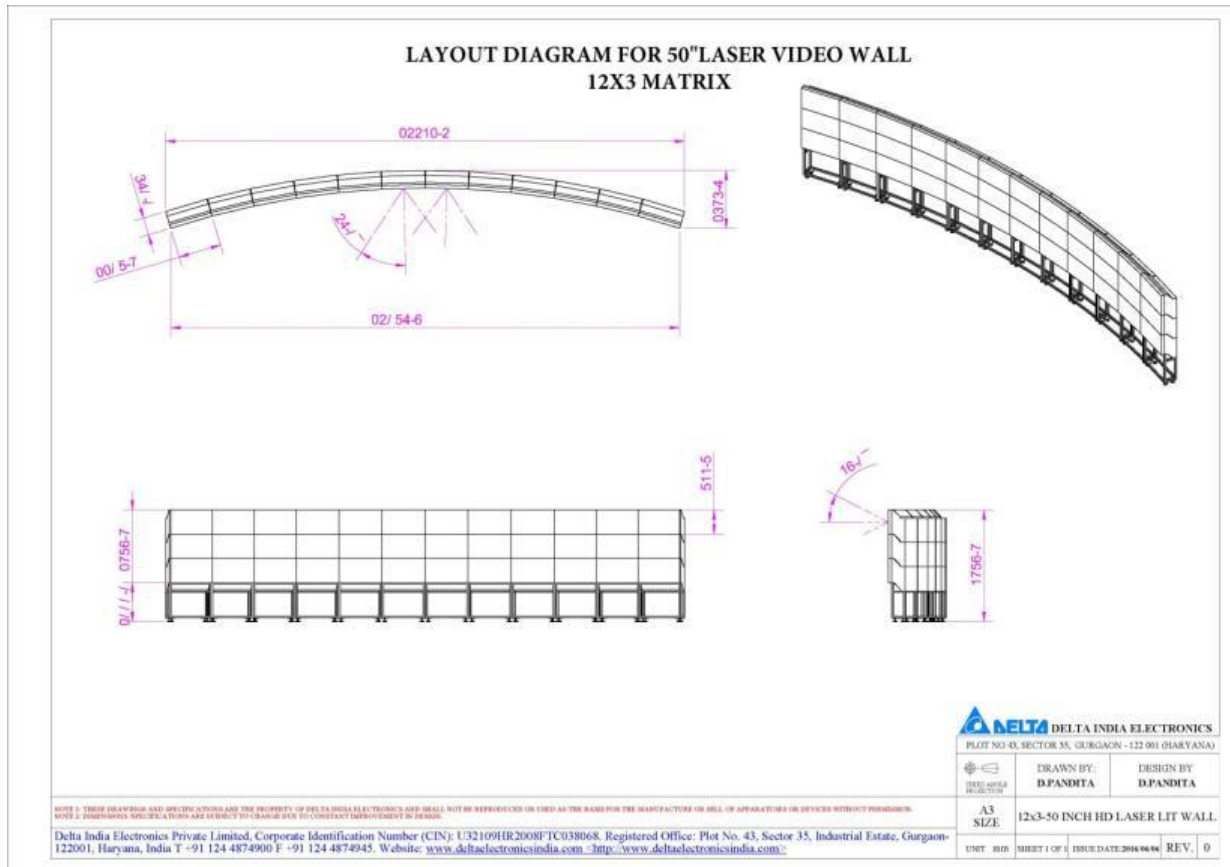
/ Video signals preview at the same time. Multiple users managing of a display wall or more display walls at the same time is also possible.

All the Layouts can be scheduled as per user convenience. Software also supports auto launch of Layouts according to specified time event by user and user log file management is also available. Offline layout creation is also possible with this s/w. It supports 48 signal sources displaying in one display unit simultaneously with freely scalable windows.

The GUI of the wall management s/w has the play back option to show the live view of all the sources on the browser. It can also manage videowall region into multiple regions as per user requirements for Grid management. It also has the Pre window option for user to be able to see multiple signal source in one window with specified time interval and with user defined sequence. Administrator can monitor & control the workstation of operators. User can control complete system through IPAD and Android system over Wi-Fi.







## 8. Application Reference

- Surat City Surveillance
- Pune City Surveillance
- Puri City Surveillance
- Bangalore Traffic Management (B-Trac)
- National Transmission Asset Management Centre - Power Grid
- Bangalore Metro Rail Corporation Ltd.