NAME OF CATEGORY: USE OF ICT FOR DEVELOPMENT BY NON-GOVERNMENT INSTITUTIONS

1. **Coverage – Geographical and Demographic** :-

(i) Comprehensiveness of reach of delivery centres,

GIFT Smart City Command & Control Center (C - 4) is catering to entire GIFT City which is spread across around 1000 Acres and going to host about 5 lac of population

(ii) Number of delivery centres

Two

(iii) Geographical

(a)National level – Number of State covered — One

(b) State/UT level- Number of District covered — One

(c) District level- Number of Blocks covered — One

Please give specific details:-

GIFT City is a municipal corporation in itself as autonomous body & UDA (Urban Development Authority)

(iv)Demographic spread (percentage of population covered)

100 % , Total population covered – 5 lakh

2. Situation Before the Initiative (Bottlenecks, Challenges, constraints etc with specific details as to what triggered the Organization to conceptualize this project):

Background: Gujarat International Finance Tec-City "GIFT City " is being developed as a global financial and IT / ITeS hub in the state of Gujarat, a first of its kind in India. GIFT has been planned as a " Smart city " with next class infrastructure using latest Information and Communication technologies . GIFT city will host commercial high rises buildings, quality residential housing, retail and recreational spaces . When fully operational , GIFT City aims to create 5 lacs direct and equal number of indirect employment opportunities when fully developed .

The GIFT City is spread across 886 acres of land near by Gandhinagar. GIFT City has both multi service SEZ (Special Economic Zone) and DTA (Domestic tariff area) . Being a Smart City, GIFT City authorities are expected to proactively monitor and manage City's Infrastructure using Information and communications technology advances for ensuring better services to the citizens .The infrastructure which need to be monitored consists of multiple utilities which are Water management system ,

Electrical infrastructure , automatic waste collection and recycling system , District cooling system, City occupier's safety , security and surveillance , Traffic management etc.

Till now there is no readily available single hardware or software platform which can monitor and manages entire city infrastructure on a single technology platform and from a single place in the city.

GIFT City is planning to carry out city infrastructure monitoring and maintenance by integration of all these utilities on a single platform which is called **"City Command and Control center (C-4) "** .

There are two parts of GIFT City Command and Control Center (C-4) . The first part (platform) will connect host all the Utilities and provide a complete view of the City Infrastructure , the second part will host CCTV Surveillance , Integration of IBMS of various building and tracking critical parameters like fire and safety , Intelligent traffic management system and PA system for handling law and order in the City .

3. Scope of Services/Activities Covered(Extent of computerization in terms of number of services computerized, Process that have been re-engineered, Services which depends on these processes, Analysis/re-design of process workflows –before (as is) and after (To be) reengineering , level of automation (number of services computerized) #

1. Monitor and manage the city infrastructure proactively.

2. Water supply distribution and monitoring system by using Sensors and automation build at various places across the water distribution system, all of these sensors and automation will be connected to City Command and Control centre . This connected Water system will ensure zero discharge for GIFT city

3. Ensuring zero water discharge city by effectively monitoring the water systems by implementing sensors and integrating them with City wide ICT infrastructure.

4. Managing traffic across the city by using cameras, PA (Public addressing) system, Digital Signage and touch panel based information kiosk.

5. Any disaster can be addressed by using the analytics placed on GIS based City management system which is connected to every utility, building and infrastructure by City wide Fibre optic network.

6. Better & advance healthcare facilities for citizens.

7. Addressing digital divide in the society. The use of technology will ensure enhancement of standard of living of the Citizens of the city.

8. Visitor management system using NFC and RDID based systems.

9. An ICT supported automatic waste collection systems will ensure that city is clutter free.

10. Helping City authorities to carry out Municipal functions like single billing for all utilities, online complaint registration and resolution tracking. Thus a successful e-Governance implementation for betterment of the society.

11. City Security and surveillance using CCTV cameras spread across the city and by putting analytics on this CCTV infrastructure for proactive alerts. This surveillance system will also be managed and monitored from City Command and Control centre (C-4) .

12. The tight integration of Intelligent Building Management system (IBMS) installed in the commercial building and utilities .

4. Strategy Adopted

(i) The details of base line study done,

Currently everywhere across the globe multiple public utilities are implemented by different vendors / OEMs and hence there are separate platforms for monitoring and managing these utilities .These utilities are complex as utilities involved various technologies Even in the similar cities across the globe , these platforms are being operated in isolation . So as of now there is no single solution available for City Command & Control centre .

Each individual solution has it's separate cost which may vary from few lacs rupees to multi hundred Crore. The cost of solution also depends on level of automation City authorities are trying to achieve in that particular utility.

By deploying a fully operational " Centralized City Command and Control Centre " , GIFT authorities are able to see the status of various services of the GIFT city in a holistic manner and manage them on real time basis .

Practically speaking , this City Command and control centre will integrate the **" Internet of Things "** implemented across various infrastructures within GIFT city .

City Command & Control Centre (C-4) is a collection of various technologies and engineering functions . The C-4 takes inputs from various systems which are electrical, mechanical, Hydraulics by using industry protocol like **Modbus** and **Backnet** & ICT inputs from various systems like intelligent building management system & Information technology involved in various utilities.

The evolution of GIFT City Command & Control centre (C-4) provides an integrated and smart platform for City management. The availability of such a smart and Using C-4 the occupiers of the City will have access to always up and running infrastructure. This C-4 also helps City authorities to manage the city in very efficient and smart way.

(ii) Problems identified

Being a Smart City, GIFT City authorities are expected to proactively monitor and manage City's Infrastructure using Information and communications technology advances for ensuring better services to the citizens .The infrastructure which need to be monitored consists of multiple utilities which are Water management system , Electrical infrastructure , automatic waste collection and recycling system , District cooling system, City occupier's safety , security and surveillance , Traffic management etc.

Till now there is no readily available single hardware or software platform which can monitor and manages entire city infrastructure on a single technology platform and from a single place in the city.

The newly coined term **" IOT or Internet of Things "** or **" Internet of everything "** is the promising technology which can help GIFT City to become a truly **Smart City** in all aspects .

GIFT City is planning to carry out city infrastructure monitoring and maintenance by integration of all these utilities on a single platform which is called **"City Command and Control centre (C-4) "** .

There are two parts of GIFT City Command and Control Center (C-4) . The first part (platform) will connect host all the Utilities and provide a complete view of the City Infrastructure , the second part will host CCTV Surveillance , Integration of IBMS of various building and tracking critical parameters like fire and safety , Intelligent traffic management system and PA system for handling law and order in the City .

(iii) Roll out/implementation model,

The Development of GIFT City Command & Control Centre (C-4) is the first step towards making GIFT city a " Smart City " by using " Internet of Everything " .

The development and construction of building are being developed by various Builders and multiple agencies and multiple vendors .

GIFT authorities are trying to ensure that all Developers and Vendors to implement smart ICT component in all buildings (IBMS -Intelligent building management system, CCTV , Access control and Surveillance system) & utilities (Automation , M2M communication , TCP/IP interface and provision for remote monitoring and management by implementation of IP V-6 compatible technologies).

It is practically very difficult for GIFT authorities to monitor & manage the implementation of the ICT technology in every building and utility

For addressing this problem a generic set of rules and regulations (GDCR – GIFT Development Control Regulation) has been created and issued to all developers.

With the help of above mentioned Development Regulation guidelines and by ensuring implementation of Smart technologies below mentioned integration of Information technology (IT) and Operation Technology (OT) is being achieved in GIFT city :

The implementation of City Command and Control center (C-4)is a staggered implementation where we are bringing various public utilities on C-4 platform one by one . For example , first we started with CCTV surveillance system then moved HAAC infrastructure and then migrated Power infrastructure of GIFT on C-4 & then migrated Water utility & Solar Power plants to City Command & Control center platform (C-4) .

(iv) Communication and dissemination strategy and approach used.):

This is a centralized implementation which is providing support for various public utilities from the backend by the City authorities , hence does not require any kind of direct communication to the citizens of the city .

5. **Technology Platform used-**

(i) Description,

City Command and Control Center (C- 4) is a mix of various technologies . It takes inputs from various public utilities like Power , Cooling , Water , Automatic waste collection system and CCTV surveillance system, Intelligent Building Management system (IBMS) . Inputs from these utilities are Mechanical, Electrical , Electronics and even Hydraulics . Signal coming from these public utilities are converted to IT signal by using various protocols like Modbus, Back-net etc and converted to TCP/IP inputs and taken to City Command & Control Center (C -4) platform . This C -4 software is based on Java Platform.

(ii) Interoperability

Yes , open to various electrical , electronic , Mechanical , Hydraulics ,TCP/IP inputs .

(iii) Security concerns

There are two security related concerns for this project which are as below :

1. Terrorist attack: The GIFT City is becoming financial hub for the country. This City will host companies like Banks, Insurance Companies, Stock exchanges which are the natural targets of any kind of terrorist activities.

   To add here GIFT City's Command and Control Center (C- 4) will be heart of City's Operations . To prevent any kind of such misshape, GIFT City is building two such City Command & Control Center (C-4) in GIFT City . Both of the C-4 will work in ring architecture where even if one C-4 is fully destroyed, other C-4 will automatically take care. There will be no impact on City operations.

2. Cyber-attack: GIFT City Command and Control Centre is also available on Mobile and tablet platform for monitoring and management remotely in case of emergency. Now this gives threat for Cyber-attack on C-4 platform. We are implementing dual authentication method to protect any kind of Cyber-attack on C-4 platform. Also the access on mobile device is purely on license which is installed on the mobile device for accessing the C-4 platform.

(iv) Any issue with the technology used:

No specific issue is observed.

(v) Service level Agreements(SLAs) (Give details about presence of SLA, whether documented, whether referred etc. #)

SLA : GIFT City is committed for 99.99 % uptime of all public utilities . There are independent SLA for each utility and City Command and Control Center will (C-4) deliverables are in line with these SLAs .

6. Adherence to Service Level Agreement (SLA) – Give details about presence of SLA whether documented, whether referred etc, certificate from user department is mandatory #)

Not available

7. Citizen Centricity (Give specific details on the following#)

(i) Impact on effort, time and cost incurred by user,

The C-4 is purely for Citizen services where it is monitoring and managing Public Utilities and providing surveillance services. Total cost involved is around 30 lacs and it will increase with addition of various utility services.

(ii) Feedback/grievance redressal mechanism,

GIFT Smart City Command and Control center (C-4) is providing backend support to City Management cell (a small call center which is planned to be setup in due course of time) also there will be interfaces with Citizens using Social Media connectors available on City Portal .

(iii) Audit Trails,

Audit trails are available within the system in form of email/ SMS alerts , Audit logs are available based on IP from which the application was accessed .

(iv) Interactive platform for service delivery,

Graphical User Interface

(v) Stakeholder consultation

City Managers and City authorities are consulted at every stage of the deployment .

8. User convenience (Give specific details about the followings #)

(i) Service delivery channels (Web, email, SMS etc.)

GUI -> Direct viewing of various events are visible from the main screen of the software for the Command and control Center platform(C-4).

Web -> This C-4 platform is accessible from Web for various operators.

Mobile / Tablet platform -> This C-4 platform is available from Mobile and tablets .

Email -> Email Alerts are configured for every public utility for various parameters .This alerts are going to responsible individual, his supervisor and head of the department also. This helps for proactively addressing the problems.

SMS -> SMS are sent to various responsible person for all configured alerts. Citizen gets alert on their mobile regarding status of their problem.

(ii) Completeness of information provided to the users,

Complete information in short form including system component details and location are sent to the maintenance team for necessary action .

(iii) Accessibility (Time Window),

24 hours a day , all days of the week

(iv) Distance required to travel to Access Points

No distance has to be travelled as all C-4 alerts are on email and SMS .

(v) Facility for online/offline download and online submission of forms,

Yes

(vi) status tracking

Yes , Available online , over email , SMS and Mobile

9**. Cost to user** (Give details about impact on Service charge paid, travel cost, indirect cost incurred by the user, number of payment channels, etc. #)

No cost for end user (citizen of the GIFT City)

10. Efficiency Enhancement (Give specific details about the following #)

(i) Volume of transactions processed,

100000 transaction every month , this also depends on number of alerts generated by various utilities

(ii) Coping with transaction volume growth

Platform is scalable and able to handle the ever increasing transaction .

(iii) Time taken to process transactions,

0.10 seconds

(iv) Accuracy of output,

100 %

(v) Number of delays in service delivery

No delay as such

11. Problem Resolution and Query Handling (Give details about availability of help desk, query resolution mechanism, single window resolution, interactive interface etc. #)

Various systems produces Electrical , HVAC & WATER uses various PLC systems from multiple OEMs , we try to take all these inputs to **City Command and Control centre platform , C-4 for providing Citizen services .**

City Command & Control centre (C-4) platform takes inputs from following systems in Ethernet / electrical format , converts them to TCP/IP and take signals in TCP/IP format over Ethernet to City Command & Control Centre (C-4) .Where these inputs are monitored and managed on real time basis .

There are various alerts configured on C-4 platform for multiple operation critical events.

These events are sent to all concern people over Email using SMTP services and SMS (Short Messaging services) using GSM Gateway which have direct interfaces with City Command and Control Centre C-4 application. The real time sharing of information helps to proactively address the problem in any of the systems thus ensuring faster Citizen Services.

12. Innovation(Give details on extent to which the service is unique compared to other similar services, impact on number of steps required, identification and removal of bottlenecks/irrelevant steps etc. #)

Currently everywhere across the globe multiple utilities are implemented by different vendors / OEMs and hence there are separate platforms for monitoring and managing these utilities .These utilities are complex as utilities involved various technologies Even in the similar cities across the globe , these platforms are being operated in isolation . So as of now there is no single solution available for City Command & Control centre .

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13. Sustainability (Give details about Self sustainability of these w.r.t Organization (hiring trained staff, training etc.), financial (Scope for revenue generation , Cost benefit analysis of the project etc. #)

Training : This platform is being managed by GIFT City's own resources . As this platform has evolved over a period of time , no specific training is imparted to any operator.

Financial : We would like to explain the financial benefit of this project using below mentioned usage of the platform :

1. Proactive monitoring of Water leak detection sensors using ICT network will ensure early addressing of the problem and help in saving the water.
2. Water treatment plant sensors will ensure availability of pure, healthy & potable water across the city.
3. Monitoring of electrical infrastructure will ensure zero theft and highest uptime required for offices, business units and residents of the GIFT City. ICT based monitoring system will also help for proactive and fast resolution of consumer complaints.
4. Effective monitoring and management of waste collection system consisting of Sewage Treatment Plant (STP) & Sewage Conveyance System will help City to be " **Water neutral"** city where Waste water collected will be filtered and used at various places like irrigation of gardens , Construction of buildings and District cooling system to provider centralized air conditioning services to the Citizens of the City .
5. City wide surveillance system will ensure a **safe and secured** city for the Citizens .Analytics working on the Surveillance system is going to be a big help for prevention of crimes in the city .
6. Intelligent traffic and transport management system will ensure **smooth & accident free** traffic in the city.
7. C-4 services will help City authorities for carry out **Municipal functions** with the help of technology and ensure implementation of **ICT driven e-Governance** system.
8. Finally the C-4 solution helps to achieve the ultimate target of **Smart , Green & self-sustainable city.**

14. Adaptability Analysis

(i) Measures to ensure adaptability and scalability

This is an open platform where we can integrate as many as utilities required for management of public utilities within GIFT Smart City using ICT technologies .

(ii) Measures to ensure replicability

(iii) Restrictions, if any, in replication and or scalability

No

(iv) Risk Analysis

There are two major risk perceived while implementing GIFT City Command & Control Center (C – 4)

1.Terrorist attack: The GIFT City is becoming financial hub for the country. This City will host companies like Banks, Insurance Companies, Stock exchanges which are the natural targets of any kind of terrorist activities.

To add here GIFT City's Command and Control Center (C- 4) will be heart of City's Operations . To prevent any kind of such misshape, GIFT City is building two such City Command & Control Center (C-4) in GIFT City . Both of the C-4 will work in ring architecture where even if one C-4 is fully destroyed, other C-4 will automatically take care. There will be no impact on City operations.

2. Cyber-attack: GIFT City Command and Control Centre is also available on Mobile and tablet platform for monitoring and management remotely in case of emergency. Now this gives threat for Cyber-attack on C-4 platform. We are implementing dual authentication method to protect any kind of Cyber-attack on C-4 platform. Also the access on mobile device is purely on license which is installed on the mobile device for accessing the C-4 platform. Also the communication between mobile devices and C-4 platform is encrypted .

Remaining all perceived risks have been mitigated .

15. Privacy & Security Policy - (Give details about security technique deployed , use of digital signature, encryption etc #)

GIFT City Command and Control Centre is also available on Mobile and tablet platform for monitoring and management remotely in case of emergency. Now this gives threat for Cyber-attack on C-4 platform. We are implementing dual authentication method to protect any kind of Cyber-attack on C-4 platform. Also the access on mobile device is purely on license which is installed on the mobile device for accessing the C-4 platform. Also the communication between mobile devices and C-4 platform is encrypted .

16. E-inclusion(Give details about availability of local language interface, Online submission of forms, length and breadth of services made available online, universal accessibility of the application).

Local language : Not available
Online submission form : Available (under development)
Universal accessibility: Available on Mobile , Tablet and on SMS and email .

17. **Result Achieved/ Value Delivered** to the beneficiary of the project-(share the results, matrices, key learning's, feedback and stakeholders statements that show a positive difference is being made etc):

(i) To organization

a) Water supply distribution management

➔ 1. Reduced wastage of water
2. Efficient use of available water
3. Remote pump operations thus ensuring less human interface
4. Quality / PH / Turbidity / Conductivity check of water at various level . This helps in achieving long term objective of getting Potable water from each tap in the GIFT City
5. Helps to achieve Green City objectives

b) Proactive monitoring of Power(electrical) and HVAC infrastructure

➔ 1. Ensure highest uptime for electricity in the city . This is key for smooth operation of a Smart City
2. Alerts and faults information related to power and HVAC systems are sent to field team over email and SMS ensures fast fault resolution .This ensures happy and satisfied Citizens(customers) .
3. Tracks the usage patterns and helps for better demand forecast .
4.Monitoring of HVAC infrastructure on mobile allows them to switch off the air conditioning if it has remained on after office hours . No HVAC operator has to physically switch off the air conditioning systems. This ensure power savings .
5. HVAC operator does not have to move from office to office for checking and fine tuning the temperature , it is done remotely from City Command and Control center platform .
6. Earlier the electrical department work manual or at the most they were relying on the reading coming from SCADA system in the substation but post integration of electrical systems , there work is very simplified . They just have to monitor their entire infrastructure from their own Computer & Mobile screens.

7. All alerts are received over SMS and email .These alerts goes to field team as well as upto the management level. This increases the accountability of every team member and this ensure faster resolution of problems

c) CCTV surveillance system

➔ 1. CCTV surveillance ensures a safe and secured living for the citizens .
2. Proactive monitoring using Analytics built on CCTV surveillance systems will ensure reduction in crime rate in the CITY .
3. Cameras spread across the city will help in Traffic management using PA systems & Digital signage.

Automation & smartness built in the system will bring more efficiency, reduce Opex and reduce manpower cost required to manage the utilities .As per his views , with enhanced automation and better citizen services , technology will contribute in increase in Citizen satisfaction and will surely bring in additional revenues .

(ii) To citizen

1. Proactive monitoring of Public Utilities increases the uptime of the Utilities which in turn increases the enhanced services for the citizens .

2. Integration of building IBMS with GIFT IBMS ensures that all life threatening and critical parameters are being monitored . This enhances confidence of Citizens of the city .

3. In near future citizens will be able to lodge calls online using Social Media , Email and SMS which with City Management cell using City portal and other tools . This will help for a faster resolution of their problems .

(iii) Other stakeholders

Not applicable .

18. Extent to which the Objective of the Project is fulfilled-(benefit to the target audience i.e.G2G, G2C, G2B, G2E or any other, size and category of population/stakeholder benefited etc):

19. Comparative Analysis of earlier Vs new system with respect to the BPR, Change Management, Outcome/benifit, Change in legal system, rules and regulations

GIFT City is being developed as India's first and largest Smart City . There was no system existing earliear , This City Command and Control Center 9 C-4) is developed as Initiative to manage City's public infrastructure from a centralized platform called C-4 .

20. Other distinctive features/ accomplishments of the project:

1.First of it's kind in India (probably world)

2.Using new concepts of " Internet of Things " or " Internet of Everything "

3.Can be a model for all other upcoming Smart Cities as planned by Govt. of India in current year's budget .

This is just an indicative list of indicators, Applicant can add more information based on suitability of the project nominated.

➔ The next few pages will explain the GIFT City's Command and Control Center (C-4) Project Concept , idea behind making such a integrated system and technology involved in this project .

1.Problems faced by GIFT City Ltd. that led to the initiation of this project .

Background: Gujarat International Finance Tec-City "GIFT City " is being developed as a global financial and IT / ITeS hub in the state of Gujarat, a first of its kind in India. GIFT has been planned as a " Smart city " with next class infrastructure using latest Information and Communication technologies . GIFT city will host commercial high rises buildings, quality residential housing, retail and recreational spaces . When fully operational , GIFT City aims to create 5 lacs direct and equal number of indirect employment opportunities when fully developed .

The GIFT City is spread across 886 acres of land near by Gandhinagar. GIFT City has both multi service SEZ (Special Economic Zone) and DTA (Domestic tariff area) .

The GIFT Project involves development of infrastructure and real estate through various activity based enclaves. GIFTCL would lease development rights for development of real estate, which would be developed by various real estate developers and end users.

GIFT development area is under control of GIFT Urban Development authority. Municipal functions in GIFT area are being carried out by GIFT Notified committee (GIFTUDA – GIFT URBAN DEVELOPMENT AUTHORITY).

Problem faced and solution by deploying technology:

Being a Smart City, GIFT City authorities are expected to proactively monitor and manage City's Infrastructure using Information and communications technology advances for ensuring better services to the citizens .The infrastructure which need to be monitored consists of multiple utilities which are Water management system , Electrical infrastructure , automatic waste collection and recycling system , District cooling system, City occupier's safety , security and surveillance , Traffic management etc.

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fire and safety , Intelligent traffic management system and PA system for handling law and order in the City .

By integrating various infrastructure and Utilities by connecting them on a single fibre optic based ICT network spread across the city and by building Intelligence in every upcoming Building and Utility , GIFT City is trying to achieve following :

1. Monitor and manage the city infrastructure proactively.

2. Water supply distribution and monitoring system by using Sensors and automation build at various places across the water distribution system, all of these sensors and automation will be connected to City Command and Control centre . This connected Water system will ensure zero discharge for GIFT city

3. Ensuring zero water discharge city by effectively monitoring the water systems by implementing sensors and integrating them with City wide ICT infrastructure.

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The evolution of GIFT City Command & Control centre (C-4) will provide a integrated and smart platform for City management. The availability of such a smart and Using C-4 the occupiers of the City will have access to always up and running infrastructure. This C-4 also helps City authorities to manage the city in very efficient and smart way.

Steps / projects implemented address the above problem :

The Development of GIFT City Command & Control Centre (C-4) is the first step towards making GIFT city a " Smart City " by using " Internet of Everything " .

The development and construction of building are being developed by various Builders and multiple agencies and multiple vendors .

GIFT authorities are trying to ensure that all Developers and Vendors to implement smart ICT component in all buildings (IBMS -Intelligent building management system, CCTV , Access control and Surveillance system) & utilities (Automation , M2M communication , TCP/IP interface and provision for remote monitoring and management by implementation of IP V-6 compatible technologies).

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1. Proactive monitoring of Water leak detection sensors using ICT network will ensure early addressing of the problem and help in saving the water.

2. Water treatment plant sensors will ensure availability of pure, healthy & potable water across the city.

3. Monitoring of electrical infrastructure will ensure zero theft and highest uptime required for offices, business units and residents of the GIFT City. ICT based monitoring system will also help for proactive and fast resolution of consumer complaints.

4. Effective monitoring and management of waste collection system consisting of Sewage Treatment Plant (STP) & Sewage Conveyance System will help City to be " **Water neutral"** city where Waste water collected will be filtered and used at various places like irrigation of gardens , Construction of buildings and District cooling system to provider centralized air conditioning services to the Citizens of the City .

5. City wide surveillance system will ensure a **safe and secured** city for the Citizens .Analytics working on the Surveillance system is going to be a big help for prevention of crimes in the city .

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7. C-4 services will help City authorities for carry out **Municipal functions** with the help of technology and ensure implementation of **ICT driven e-Governance** system.

8. Finally the C-4 solution helps to achieve the ultimate target of **Smart , Green & self-sustainable city.**

Technical aspects used in the Project:

This project uses a combination of **Operational Technology (OT)** & **Information Technology (IT)** .

Various systems produces Electrical , HVAC & WATER uses various PLC systems from multiple OEMs , we try to take all these inputs to **City Command and Control centre platform , C-4 for providing Citizen services .**

City Command & Control centre (C-4) platform takes inputs from following systems in Ethernet / electrical format , converts them to TCP/IP and take signals in TCP/IP format over Ethernet to City Command & Control Centre (C-4) .Where these inputs are monitored and managed on real time basis .

There are various alerts configured on C-4 platform for multiple operation critical events.

These events are sent to all concern people over Email using SMTP services and SMS (Short Messaging services) using GSM Gateway which have direct interfaces with City Command and Control Centre C-4 application. The real time sharing of information helps to proactively address the problem in any of the systems thus ensuring faster Citizen Services.

Please refer the attached Project report for further details on technical integration. The report also contains screen shots taken from live C-4 platform.

Unique aspects of the project . Highlight how innovatively the project was implemented in your organization :

Currently everywhere across the globe , Public utilities are implemented by different vendors / OEMs and hence there are separate platforms for monitoring and managing these utilities .These utilities are complex as their systems are made of various technologies , even in the similar cities across the globe , these platforms are being operated in isolation . So as of now there is no proven single solution available for complete integration of all public utilities of a city on a single platform .

Each individual solution from public utility has it's separate cost which may vary from few lacs rupees to multi hundred Crore. The cost of solution also depends on level of Automation City authorities are trying to achieve in that particular utility.

By deploying a fully operational " Centralized City Command and Control Centre " , GIFT is trying to see the status of various services of the GIFT city in a holistic manner and manage them on real time basis .

Practically speaking, this City Command and control centre will integrate the **" Internet of Things "** implemented across various infrastructures within GIFT city .

City Command & Control Centre (C-4) is a collection of various engineering functions & Information and communication technology .These functions are interconnected using Cisco router , switches and other devices . The C-4 platform takes inputs from various systems which are electrical, mechanical, Hydraulics by using industry protocol like **Modbus** and **Backnet** & ICT inputs from various systems like intelligent building management system & Information technology involved in various utilities and present them to the City Authorities (City Managers) for smooth monitoring and management of these utilities .This allow City authorities to operate various functionality of Smart City in tandem.

The evolution of GIFT City Command & Control centre (C-4) provides an integrated and smart platform for City management. By virtue of such a smart C-4 platform , Citizens of GIFT City will have access to always up & running infrastructure . This C-4 also helps City authorities to manage the city in very efficient and smart way.

IMPACT OF THE TECHNOLOGY

key metrics used to demonstrate success of this project :

Impact of Tehchnology		
Sr.no.	Metrics	Value determining success
1	Proactive monitoring of City Infrastructure	Always available Citizen services
2	Water supply distribution management	1. Reduced wastage of water 2. Efficient use of available water 3. Remote pump operations thus ensuring less human interface 4. Quality / PH / Turbidity / Conductivity check of water at various level . This helps in achieving long term objective of getting Potable water from each tap in the GIFT City 5. Helps to achieve Green City objectives
3	Proactive monitoring of Power(electrical) and HVAC infrastructure	1. Ensure highest uptime for electricity in the city . This is key for smooth operation of a Smart City 2. Alerts and faults information related to power and HVAC systems are sent to field team over email and SMS ensures fast fault resolution .This ensures happy and satisfied Citizens(customers) . 3. Tracks the usage patterns and helps for better demand forecast . 4.Monitoring of HVAC infrastructure on mobile allows them to switch off the air conditioning if it has remained on after office hours . No HVAC operator has to physically switch off the air conditioning systems. This ensure power savings . 5. HVAC operator does not have to move from office to office for checking and fine tuning the temperature , it is done remotely from City Command and Control centre platform .
4	CCTV surveillance system	1. CCTV surveillance ensures a safe and secured living for the citizens . 2. Proactive monitoring using Analytics built on CCTV surveillance systems will ensure reduction in crime rate in the CITY . 3. Cameras spread across the city will help in Traffic management using PA systems & Digital signage.

Impact of your initiative / innovation on the various stack holders of the organization. Provide specific examples / details explaining the same :

Stockholder	Impact
Electrical department (GIFT Power Company Ltd.) GIFT District Cooling solution Company Ltd.)	1. Earlier the electrical department work manual or at the most they were relying on the reading coming from SCADA system in the substation but post integration of electrical systems , there work is very simplified . They just have to monitor their entire infrastructure from their own Computer & Mobile screens. 2. All alerts are received over SMS and email .These alerts goes to field team as well as upto the management level. This increases the accountability of every team member and this ensure faster resolution of problems. 3. Both the departments now actually understand the peak demand and able to size the transformers and other backend infrastructure well in advance .
Customer (Customer retention , Repeat purchase , Customer Satisfaction etc.)	1. Proactive monitoring of Public Utilities increases the uptime of the Utilities which in turn increases the enhanced customer satisfaction . 2. Integration of building IBMS with GIFT IBMS ensures that all life threatening and critical parameters are being monitored . This enhances confidence of Citizens of the city .
CCTV surveillance system	1. Integration of cameras across the city ensures monitoring of the city from a single place , the date collected can be used for any forensic purposes .Analytics (planned for implementation in Sep-14) ensure proactive monitoring of entire city from prevent any event .

ACCEPTABILITY OF TECHNOLOGY INNOVATION

Hurdles / challenges faced by in implementing the initiative / project :

->There were three major challenges at the start of the project:

a. The first was that there is no proven hardware / software technology platform available for managing all public utilities on single platform.

b. Buildings and Utilities are built by Real Estate developers and multiple OEMs . They may not built the kind of intelligence which we are looking into any system to ensure that it can be integrated with GIFT City Command & Control centre .

b. The investment required for this project was coming out to be very high and there were no tangible returns on this investment in near future .

1. How did you overcome the challenges / hurdles?

a. We did a lot of research on the subject . We even did few workshop with bigger players like Schneider , but could not find a suitable solution . We decided to go ahead with a step by step implementation and bring all the Public Utilities of GIFT on the C-4 platform once by one . This has helped the platform also to get matured.

b. GIFT has released GDCR (GIFT development Control regulation) , a document for developer which has certain mandatory requirements so that all buildings which are coming up are equipped with Smart City infrastructure such as Fibre optic cable reaching at every office , ICT driven IBMS (Intelligent building management system) requirements , requirements for Smart Home , Ensuring that all ICT component / systems in the building are compatible with next generation IP V-6 (Internet Protocol Version 6) . Most of these GDCR rules are vendor neutral i.e. as an Authority we are not forcing Developers to go for a particular vendor /OEM but defining rules to select latest and smart technology.
Similarly we are putting similar requirement while awarding contract for construction of every Public Utility .

c. The step by step approach allowed us to invest slowly and gives us opportunity of bringing maturity in the C-4 platform .So initially Phase 1-A was completed which integrate Electrical , HVAC , Water and Security and Surveillance part of the City on C-4 platform . To add we have avoided (postponed) few expenses e.g. Video wall which was a costly item , was not purchase in the initial phases and we used professional display panels in place of Video Wall . We will be

purchasing video wall in current phase of C-4 development. The earlier purchase professional display panels will be used as other places .

Now with increase in the number of new developments in the city , we are putting the C-4 in next phase of development .

2. What technique and incentives were used to encourage acceptability of the technology innovation across the organization?

-> Gift being a Smart City , always had a management which believes that technology can bring positive change in Citizen's life . GIFT management has great emphasis on use of Information and communication technology and automation at every possible place .**In a Smart City the role of City authorities changes to City Manager to serve the Citizens of the City** . Even the users at the middle management and field are happily accepting the use of technology. Because of strong push from the management and everyone else , we never had any kind of resistance in using ICT for management of the Public Utilities , infect there are demands to bring in more automation and Smartness in day to day operations .

PROJECT REPORT

Gujarat International Finance Tec City Ltd.

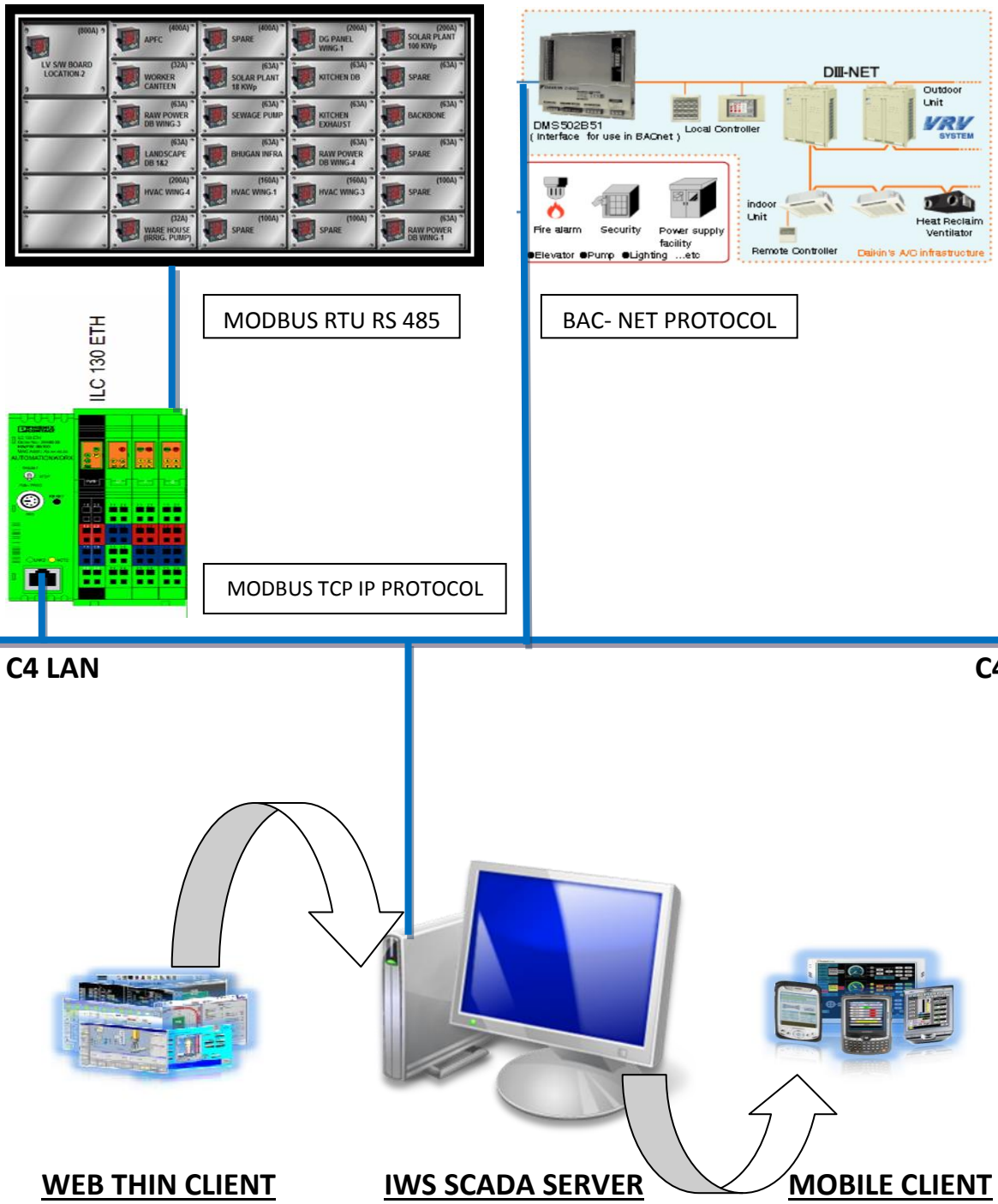
City Command and Control Center (C-4)

ZONAL FACILITY OFFICE, GIFT CITY

SYSTEM CONFIGURATION

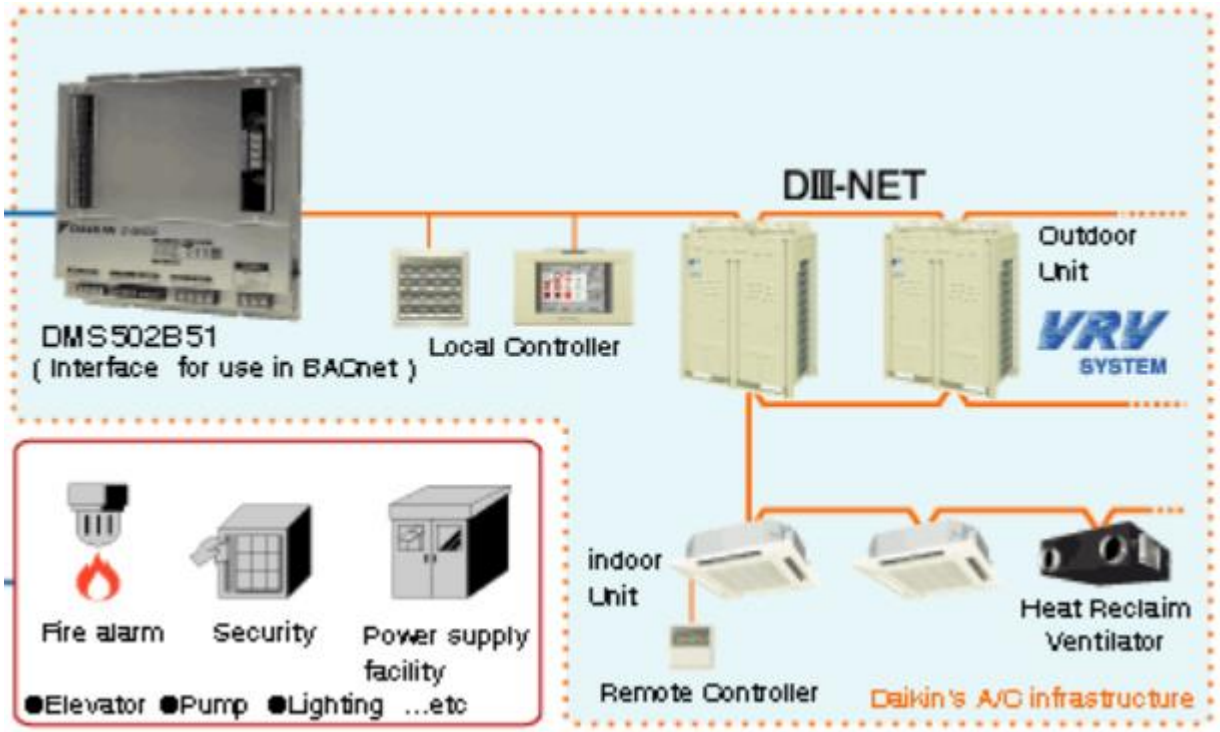
ZFC POWER CONTROL CENTER

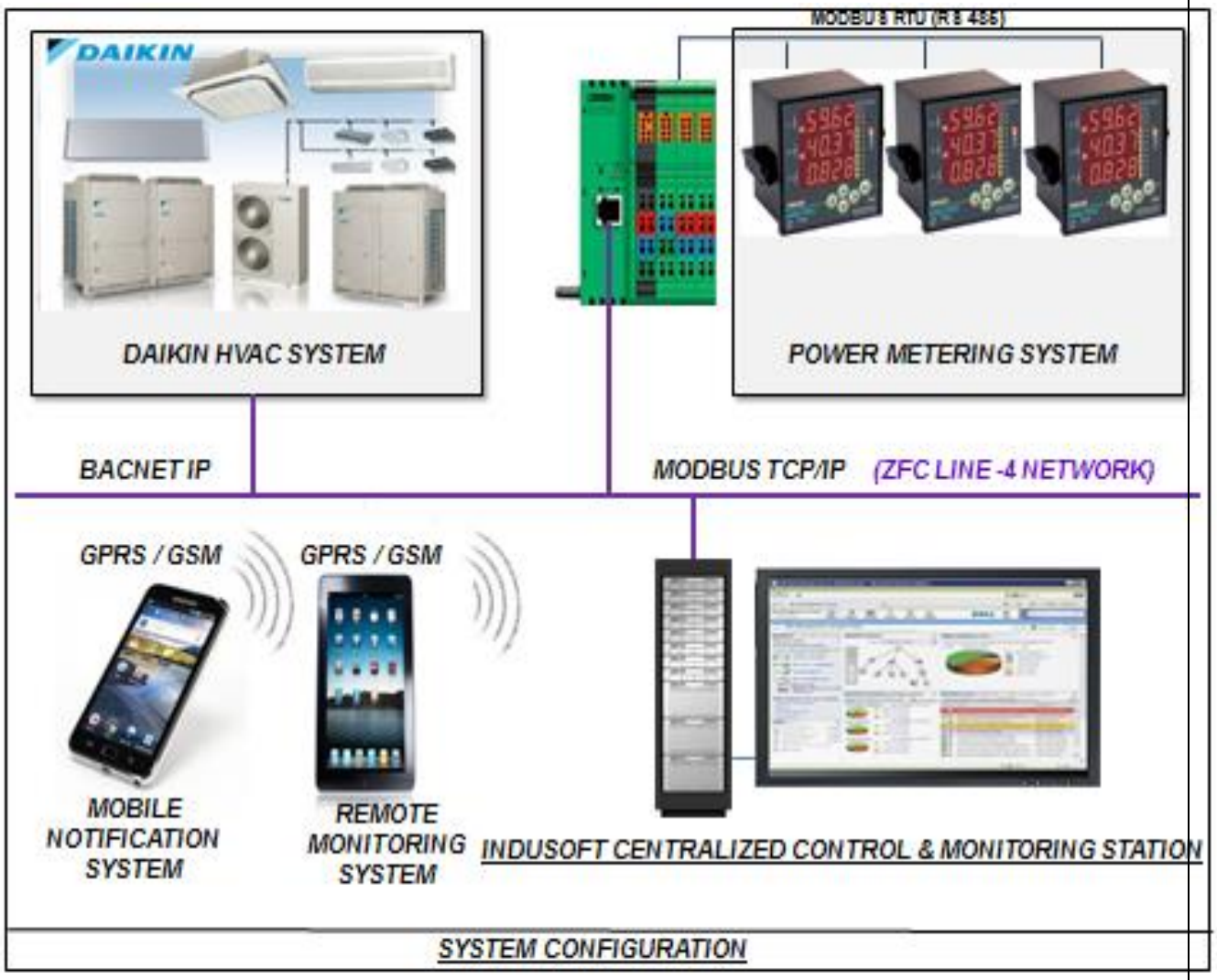
DAIKIN I TOUCH CONTROLLER



WEB THIN CLIENT **IWS SCADA SERVER** **MOBILE CLIENT**

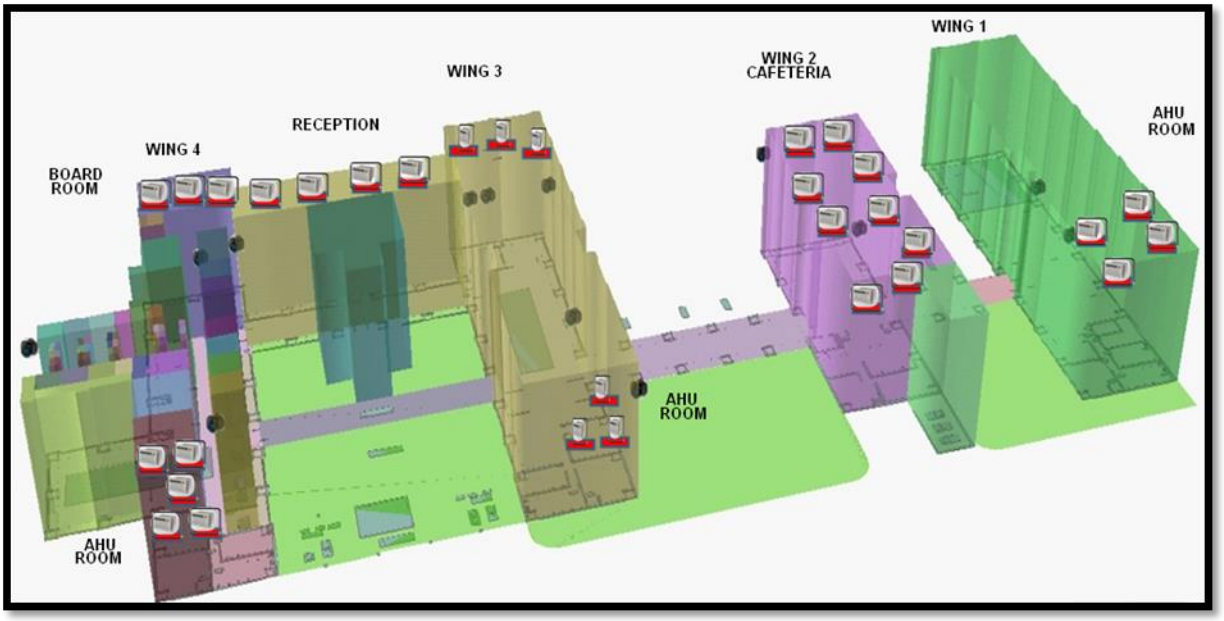
HVAC Control & Monitoring System at Zonal Facility Centre





SYSTEM CONFIGURATION

SCADA control & Monitoring Daikin make HVAC system via the BACnet communication.



HVAC Controller Location: Wing-3

HVAC Controller Make: Daikin

HVAC Controller Mode No.: DMS502B51

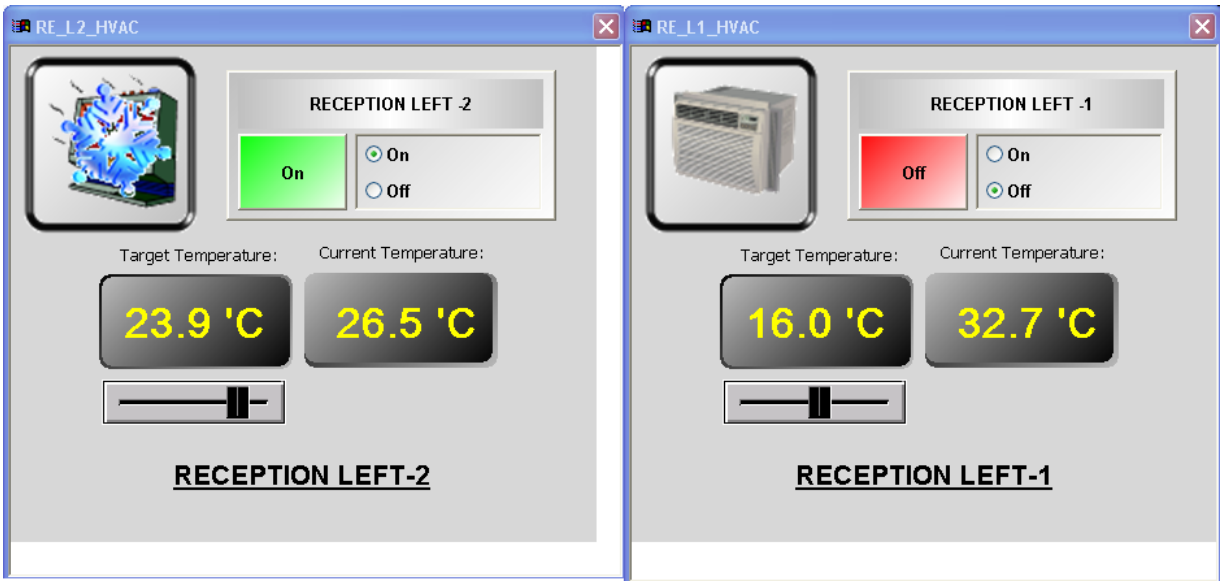
Date Communication: BACnet

Total no. of Unit: 31 [Wing-1: 4, Wing-2: 9, Wing-3: 10, Wing-4: 8]

1. ZFC HVAC I-TOUCH CONTROLLER ADDRESSING

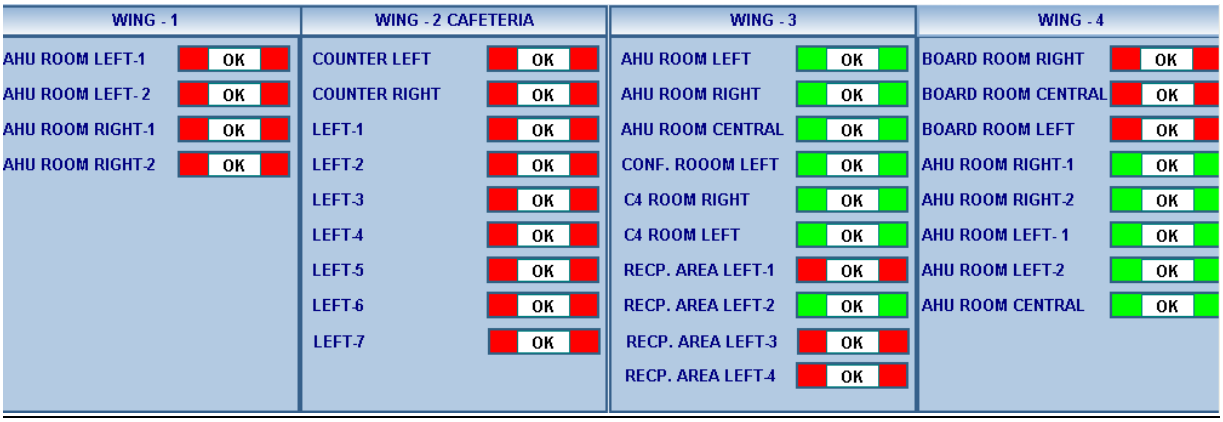
Sr. no.	ZONE NAME	ADDRESSING NAME
1	WING 1 AHU ROOM	LEFT 1
		LEFT 2
		RIGHT 1
		RIGHT 2
2	WING 2 CAFETERIA	COUNTER LEFT
		COUNTER RIGHT
		LEFT 1
		LEFT 2
		LEFT 3
		LEFT 4
		LEFT 5
		LEFT 6
		LEFT 7
3	WING 3 AHU ROOM	LEFT
		RIGHT
		CENTRAL
	WING 3 CONFERENCE ROOM	LEFT
	WING 3 C4 ROOM	RIGHT
		LEFT
	RECEPTION AREA	LEFT 1
		LEFT 2
		LEFT 3
		LEFT 4
4	WING 4 BOARD ROOM	RIGHT
		CENTRAL
		LEFT
	WING 4 AHU ROOM	RIGHT 1
		RIGHT 2
		LEFT 1
		LEFT 2
		CENTRAL

2. Air Conditioner Control/Monitor Items



Function	Description
Start/Stop operation	Start/Stop the air conditioner and Monitors the status.
Room Temperature Setting	Set the room temperature and Monitors the result`.

3. Air Conditioner Malfunction Code



Function	Description
Malfunction Code	Displays a malfunction code specified by the manufacturer if an air conditioner in the system has a malfunction.

Screen shot of HVAC integration at City Command and Control centre :

4. Various error codes of HVAC system :

2nd / 1st		0	1	2	3	4	5	6	7	8	9	A	H	C	J	E	F
indoor	A	Protection device activ.(gen)	Faulty indoor PCB	Fan interlock	Abnorm. drainH2O level	Abnorm. Heat-exch.1 temp.	Abnorm. heat exch.2 temp.	Fan mot. Ol. & Oc. Lock	Air swing Mot. lock	AC inp.OC Err pow suppl volt ind	Faulty electronic exp.valve	Heater overheat.	Faulty or dirty dust collector	No-load operation	Faulty cap'y set (indoor)	Insufficient water supply	Faulty humidifier
	C	Faulty sens. sys. (general) Transmiss err Fandrive/contr			Faulty drainH2O level sens. system	Faulty heat-exch.1 temp. Sens. Syst.	Faulty heat-exch.2 temp. Sens.syst.	FanmotOL/OC Oc, lock sens. Incorr comb. Fandrive/set	Air swing motor lock Faulty sens. Syst.	Faulty AC input curr. Sens. syst.	Faulty suct.air temp. Sens.syst	Faulty disch.air tmp. Sens. Syst.	Faulty dirt sensor	Faulty humidity sens. Syst.	Faulty tmp. sensor syst. (r.c)	Faulty rad.sensor system	Faulty high pr. switch
outdoor	E	Safety dev. activation (general)	Faulty outd.PCB		High pr. Sw. (HPS)	Low pr. Sw.(LPS)	Compr.mot. OL.	Compr.Mot. Overcurr. Lock	Fan mot. OL.OC. Lock	AC input OC	Faulty electronic exp.valve		Pump OC. Lock	Abnormal water tmp.	Activation of loc. Safety dev.	Faulty drain H2O level syst.	Faulty heat storage unit
	H	Faulty sens. Syst. (general)	Faulty air temp. Sens. Sys.	Faulty pow. Sup. Sens. Sys.	Faulty high pr. Switch	Faulty low pressure switch	Compr.mot. Faulty OL. sensor sys.	Compr.mot. OC.Lock Faulty Sens. Syst.	Fan motor Ol, Oc. , faulty lock sens.syst.	Faulty AC inp. power sens. Syst.	Faulty outd. air tmp. Sens. Syst.	Faulty dsch. air tmp. Sens. Syst.	Pump OC. Lock Fault sens Syst.	Faulty hot H2O sens. system	Float switch (local supply) Open (if Mode2-26)	Faulty drain H2O level sens. Syst.	Heat Storage unit alarm
	F	Activation common prot.dev. sys.Nr.1&2	Activation safety device Syst.No.1	Activation safety device Syst.No.2	Faulty discharge pipe temp.			Abn. heat exchanger (1) temp.			Expansion Valve faulty In BSVQ-P	Abnormal discharge pressure	Abnormal high oil temp.	Abnormal suction pressure	RWEYQ	Abnormal oil pressure	Abnormal oil surface level
	J	Faulty refrigerant temp. Sens.sys.	Faulty pressure sens. Sys. (general)	Faulty current sensor system	Faulty disch.pipe temp. Sens. Sys.	Faulty LP equiv. sat. temp. Sens. Sys.	Faulty suction pipe temp. Sens.sys.	Faulty ht. exch.1 temp. Sens. Syst.	Faulty ht. Exch.2 temp. Sens. Syst.	Faulty liq. pipe temp. Sens. Sys.	Fault gas pipe temp. sensor system	Faulty discharge pressure sens. Sys.	Faulty oil temp. Sens. Sys.	Faulty suction pr.sens. system		Faulty oil pressure sensor system	Faulty oil surface level sens. Syst.
	L	Faulty INV system			Abn.temp. rise in sw. box	Abn.temp. rise rad. fins (trans.)	DC output overcurrent (moment'y)	AC output OC (moment'y)	Equipment (Multi) gen. Input OC	Electronic thermal sw. (time lag)	Stall prevention (time lag)	Faulty power transistor		Faulty transmiss. INV ↔outd. units			
	P	Gas short. Ice thermal stor. Eqp.	Missing ph., unbal. power supply	Autocharge stopped at step 5 BS4 not pushed	Faulty sw. box temp. Sens. Sys.	Faulty rad. fin (PM) tmp. Sens. Syst.	Faulty DC curr. Sens. system	Faulty AC or DC outp. Curr. Sens. system	Equip. (Multi) gen. Inp.OC VRVIII man che vol chk nt poss.	Autocharge should be restarted	Autocharge judgm. Finished OK	Replace Charge cylinder "Master"	Replace Charge cylinder "Slave 1"	Replace Charge cylinder "Slave 2"	Faulty cap'y. Set. (outd. unit)	Auto charge Almost finished	Leak test Not poss Wo input add chg
system	U	Gas shortage	Reversed phase connected	Faulty power sup. Volt. system	Faulty transmiss (gen. or No testrun	Faulty transm. Indoor ↔outd. units	Faulty transm. ind. unit ↔ r.c.	Faulty transm. Ind. units (mst.↔ slv)	Faultcomm ↔ Outd., or to/from ht.stor.unit	Faulty transmiss. to/from remote.ctrl.	Faulty transmiss. to/from other sys.	Faulty on site setting	In/out. unit address nt entered	Faulty centr.ctrl. address setting	Fault comm. to/from peripheral eq.	Faulty transm. Ind. unit ↔ centr. ctrl.	Incorrect wir./pip. (wir./pip. Conn.Err.)
	M		Centr.eqp. Faulty PCB	VRVII VRVIII						Faulty communic. to/from centr.eq.		Faulty centr.eq. connection		Dble set of centr.eqpm. address			
other	3		Faulty circ. air hum. Sens.	Faulty out. air hum. Sens.	Faulty supply air temp. Sens.	Faulty circ.air temp. Sens.	Faulty outs.air temp.Sens.	Faulty r.c. temp.sens.				Faulty H2Oleak. sensor 1	Faulty H2Oleak. sensor 2	Faulty dew cond. sensor			
	4	Faulty humidity valve	Faulty cold H2O valve	Faulty heated H2Ovalve	Faulty cold H2O ht-exch.	Faulty heated H2O ht. Exch.											
	5		Supply air fan mot. oc.,ol	Circ.air fan motor oc., ol.	Faulty supply air INV	Faulty circ.air INV											
	6	General error	Faulty PCB	Abn. ozone concentr.	Faulty dirt sensor	Fault rm air temp. Sens. Sys.	Fault outs. air temp. sens. Syst.			Fault high volt. system		Faulty damper system	Door switch open	Humidifier element replacemt	High-perfm. Filter Replacment.	Deodorizing catalyzer replacement	Faulty simple r.ctrl.

Power Monitoring System at Zonal Facility Centre

GIFT has Schneider make electrical meters which provide RD-484 output . The outputs are in MODBUS format. This outputs are taken on Phoenix controller .These controller converts them to TCP/IP protocol which is gives to City Command and Control centre platform which present it to Screens for managing and monitoring purpose. The data collected from energy meters is used to generation of various alarms .These alarms are converted to alerts which are sent to various concerns person via email and SMS.

Energy Meter Panel Location: Wing-3

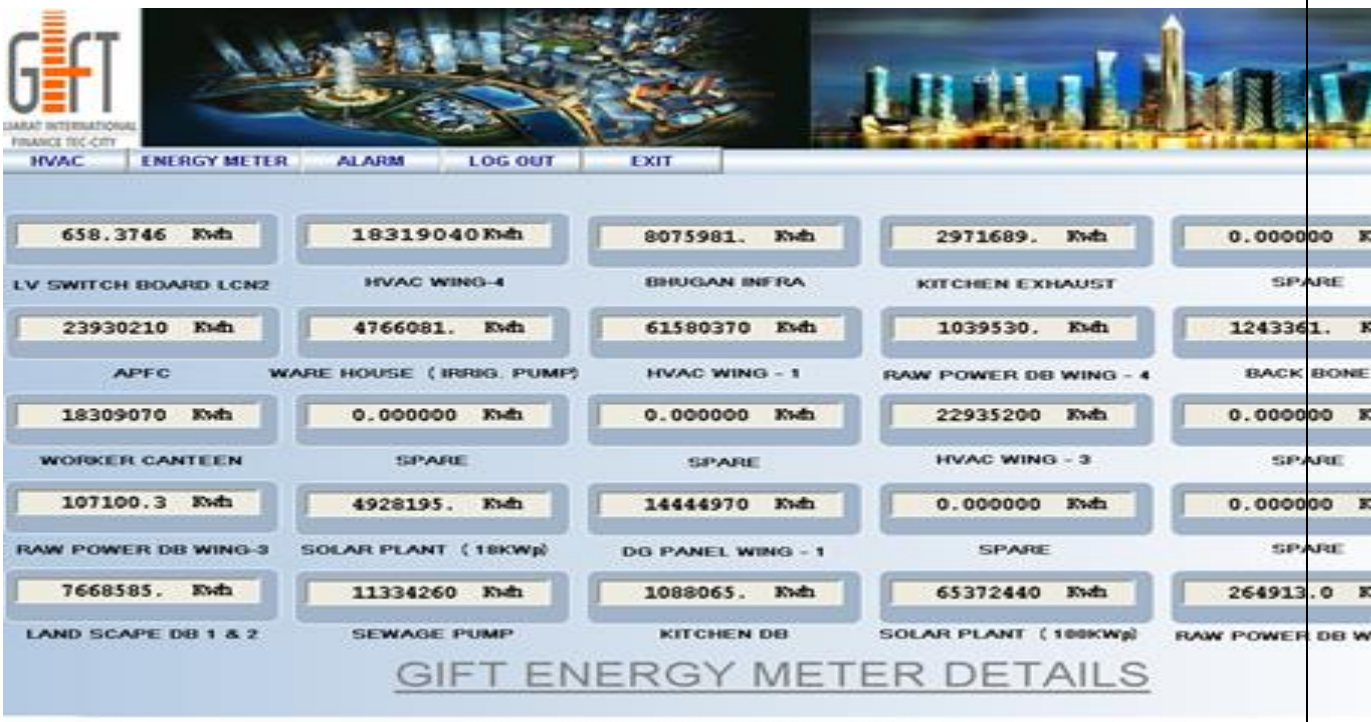
Energy Meter Make: Schneider

Energy Meter Mode No.: EM 6436

Date Communication: RS-485 Port

Total no. of Energy Meter: 25 [Incomer - 1 & Outgoing – 24]

Various Electrical system parameters can be monitored on City Command and Control centre :



User can view Energy Meter parameters by click on its symbol on screen.

EM1_DATA

ACTIVE ENERGY (KWH) : 121989900

PARAMETERS	VALUE
LINE VOLTAGE RY (V)	419.12
LINE VOLTAGE YB (V)	416.57
LINE VOLTAGE BR (V)	417.53
LINE CURRENT R (A)	242.4
LINE CURRENT Y (A)	247.6
LINE CURRENT B (A)	243.1
LINE FREQUENCY (Hz)	50.18
POWER FACTOR (PF)	-0.99
ACTIVE ENERGY (KWH)	121989900

LV SWITCHBOARD LCN - 2

SAMPLE Parameters taken from a typical electric meter and taken to C-4 Platform

1. LV SWITCH BPARD LOCATION 2

Energy Meter ID: 1

Current Capacity: 800Amp

Parameter List:

Sr. No.	Parameter	Alarm Condition
1	Line to Line Voltage RY	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
2	Line to Line Voltage YB	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
3	Line to Line Voltage BR	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
4	Line Current R	➢ Over Load [I > 40% (320Amp)]
5	Line Current Y	➢ Over Load [I > 40% (320Amp)]
6	Line Current B	➢ Over Load [I > 40% (320Amp)]
7	Frequency	
8	Active Energy KWH	

9	PF	

2. WARE HOUSE (IRRIGATION PUMP)

Energy Meter ID: 7

Current Capacity: 32Amp

Parameter List:

Sr. No.	Parameter	Alarm Condition
1	Line to Line Voltage RY	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
2	Line to Line Voltage YB	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
3	Line to Line Voltage BR	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
4	Line Current R	➢ Over Load [I > 80% (25Amp)]
5	Line Current Y	➢ Over Load [I > 80% (25Amp)]
6	Line Current B	➢ Over Load [I > 80% (25Amp)]
7	Frequency	

8	Active Energy KWH	
9	PF	

3. <u>SOLAR PLANT 18KWp</u>

Energy Meter ID: 9

Current Capacity: 63Amp

Parameter List:

Sr. No.	Parameter	Alarm Condition
1	Line to Line Voltage RY	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
2	Line to Line Voltage YB	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
3	Line to Line Voltage BR	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
4	Line Current R	➢ Over Load [I > 80% (50Amp)]
5	Line Current Y	➢ Over Load [I > 80% (50Amp)]
6	Line Current B	➢ Over Load [I > 80% (50Amp)]
7	Frequency	

8	Active Energy KWH	
9	PF	

4. SEWAGE PUMP

Energy Meter ID: 10

Current Capacity: 63Amp

Parameter List:

Sr. No.	Parameter	Alarm Condition
1	Line to Line Voltage RY	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
2	Line to Line Voltage YB	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
3	Line to Line Voltage BR	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
4	Line Current R	➢ Over Load [I > 80% (50Amp)]
5	Line Current Y	➢ Over Load [I > 80% (50Amp)]
6	Line Current B	➢ Over Load [I > 80% (50Amp)]
7	Frequency	

8	Active Energy KWH	
9	PF	

5. <u>SOLAR PLANT 100KWp</u>

Energy Meter ID: 20

Current Capacity: 200Amp

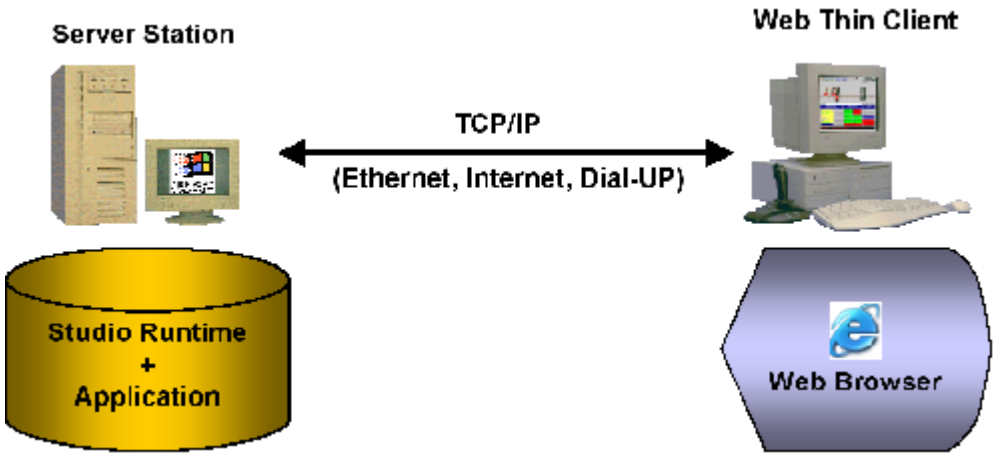
Parameter List:

Sr. No.	Parameter	Alarm Condition
1	Line to Line Voltage RY	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
2	Line to Line Voltage YB	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
3	Line to Line Voltage BR	➢ Zero Voltage (V = 0v) ➢ Low Voltage (V < 380v)
4	Line Current R	➢ Over Load [I > 80% (160Amp)]
5	Line Current Y	➢ Over Load [I > 80% (160Amp)]
6	Line Current B	➢ Over Load [I > 80% (160Amp)]
7	Frequency	

8	Active Energy KWH	
9	PF	

Web based Thin Client Services for Remote Monitoring & Interaction :

The current City Command and Control centre solution allows to create screens that can be viewed on a remote station in an Internet Explorer web browser. The station where the user can view the screens is called the thin client. This thin client is created using **Microsoft .NET** platform and server is hosted .

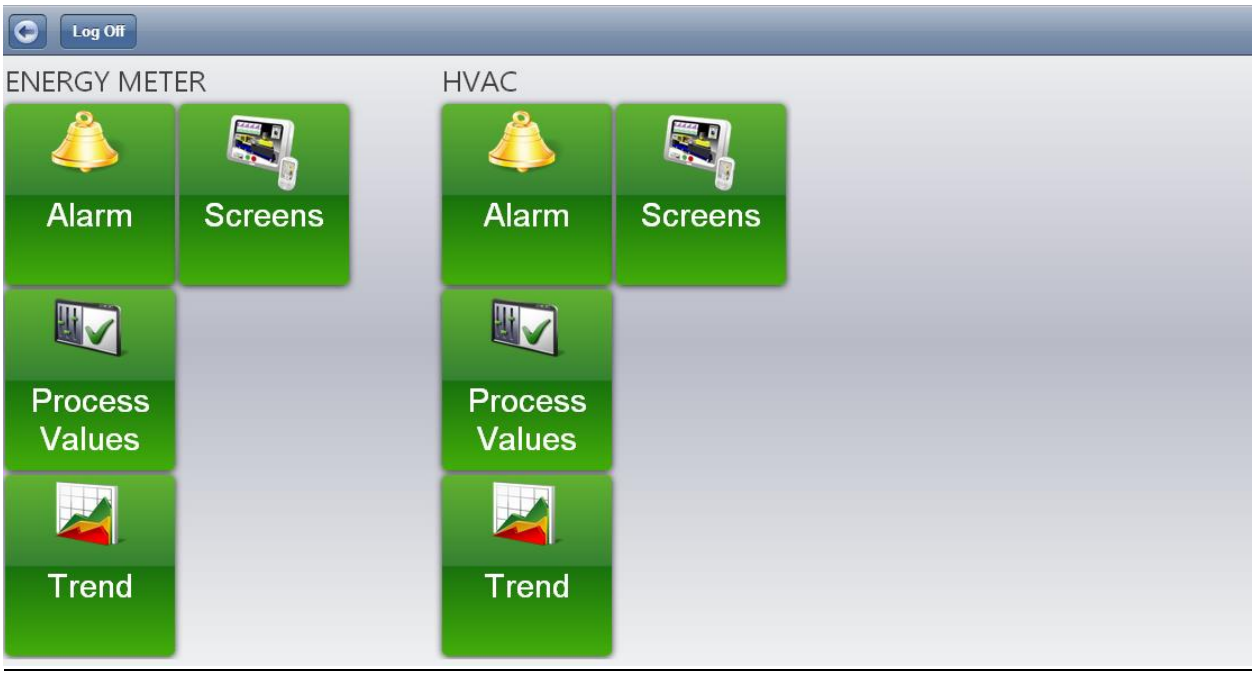


The thin client simply loads your project's graphical interface (i.e., the screens containing objects and animations) as needed and then uses that interface to represent data (i.e., tag values) on the server. Entire C-4 can be operated from the **" Thin Client "** .

Mobile Access platform for Remote Monitoring on Mobile

GIFT has implemented Mobile access solution for remote management and monitoring . We created a Mobile Access platform to create an enhanced "dashboard" that presents alarms and process values during run time. The dashboard is specifically designed to be accessed from smart phones and tablets, including iOS and Android devices.

Dashboard:



Mobile Access dashboard consists of one or more "areas", each of which has an Alarm control, a Process Values control, a Trend control, and a Screens control. These controls appear on the dashboard as green tiles, and when you click/tap one of these green tiles, it opens a new webpage for that control.

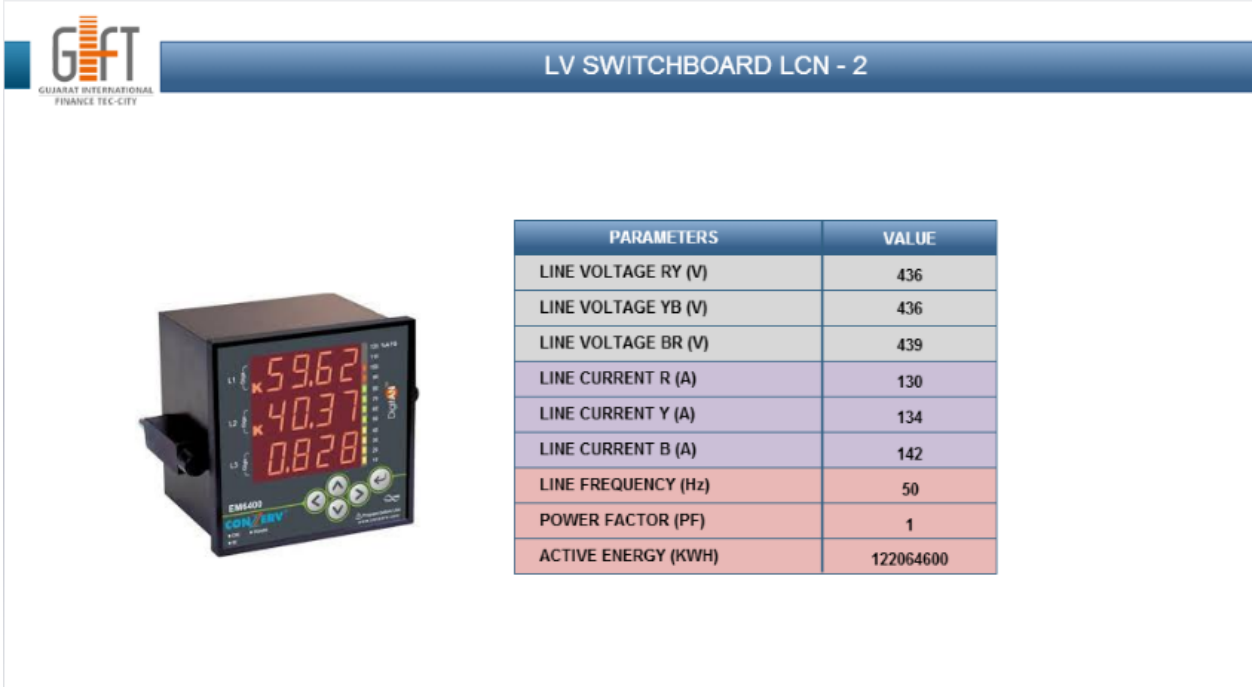
Alarm
The Alarm control displays online alarms and allows the user to acknowledge them.

Process Values
The Process Values control represents parameter values.

Screens

The Screens control shows a list of project screens.

User can open screen by click on its symbol.



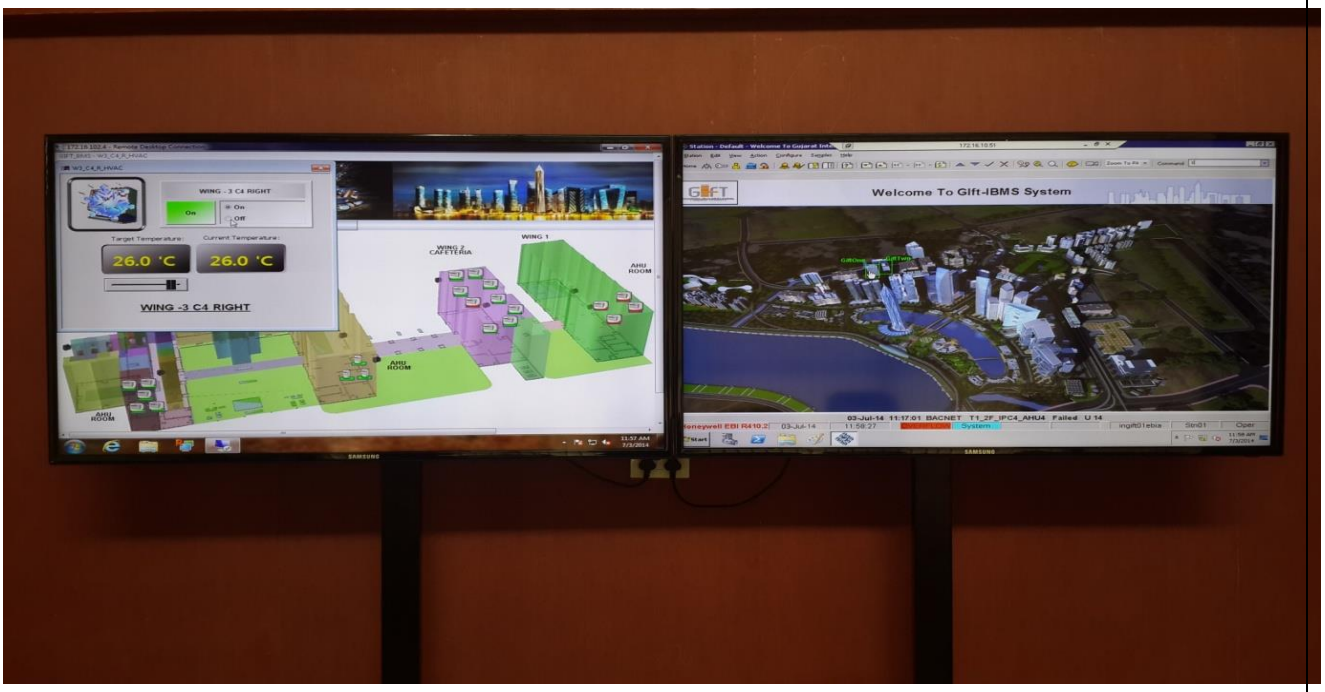
Logon Procedure:

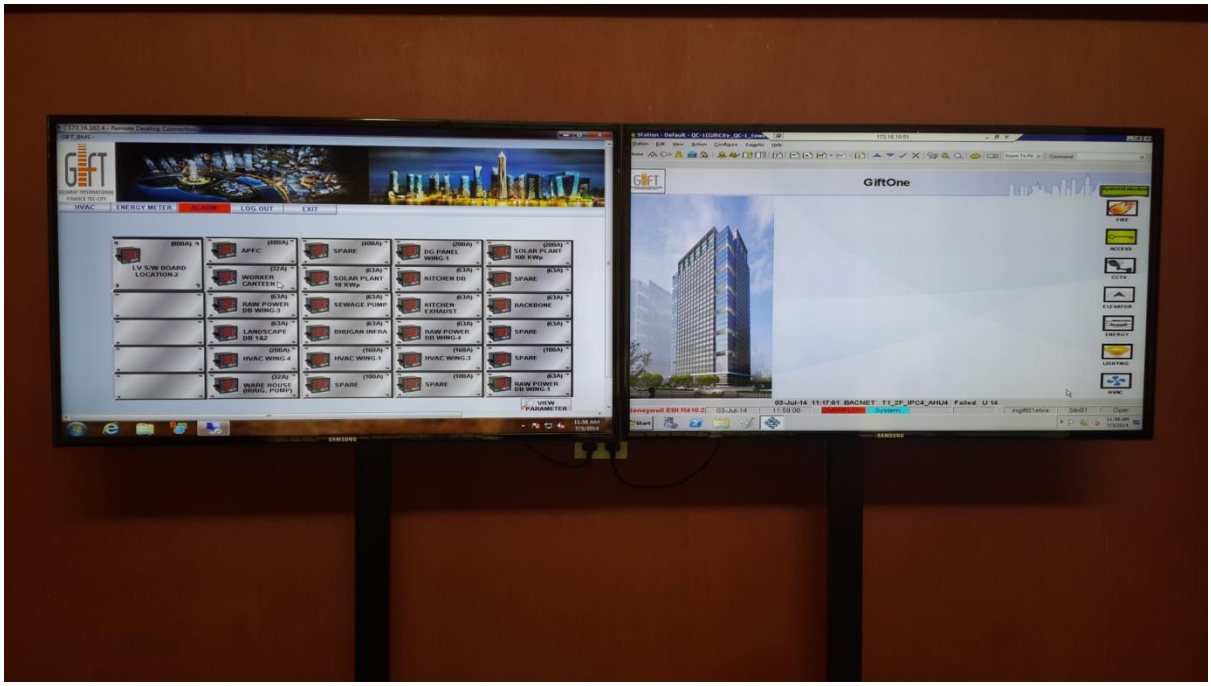
Open Web browser and type https://IP address of server station/ma/

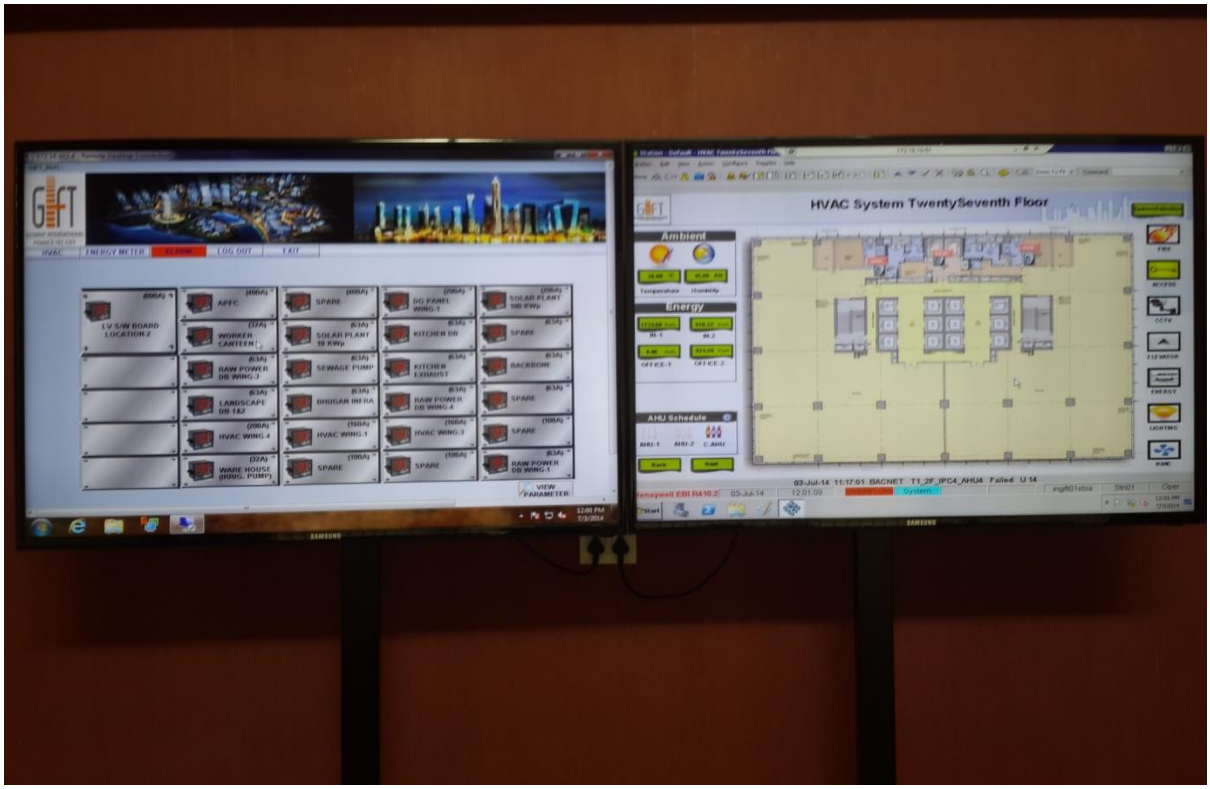
Integration of City Command and Control centre solution for SMS integration:

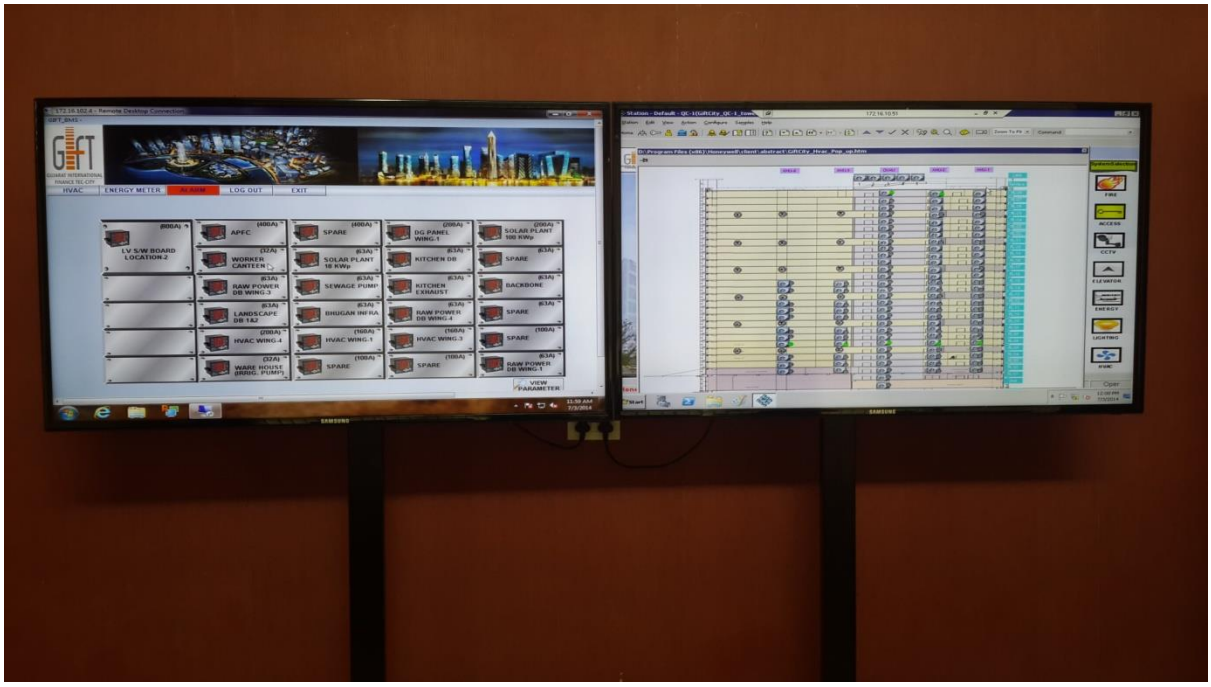
GIFT has also integrated a GSM Gateway with City Command and Control centre solution. This GSM gateway solution operates on Linux platform and it has SIM based GSM gateway.

Few of the photographs of the operational City Command & Control Centre at GIFT City :


WING - 3 C4 RIGHT
26.0 °C
26.0 °C
WING -3 C4 RIGHT
Welcome To Gift-IBMS System


GIFT
HVAC
ENERGY METER
LOG OUT
EXIT
GiftOne


GIFT
HVAC
ENERGY METER
LOG OUT
EXIT
HVAC System TwentySeventh Floor
Ambient
Energy
AHU Schedule


HVAC
ENERGY METER
ALARM
LOG OUT
EXIT
LV S/W BOARD LOCATION-2
APFC
SPARE
DG PANEL WING-1
SOLAR PLANT 100 KWp
WORKER CANTEEN
SOLAR PLANT 18 KWp
KITCHEN DB
RAW POWER DB WING-3
SEWAGE PUMP
KITCHEN EXHAUST
BACKBONE
LANDSCAPE DB 1&2
BHUGAN INFRA
RAW POWER DB WING-4
HVAC WING-4
HVAC WING-1
HVAC WING-3
WARE HOUSE (BRDG. PUMP)
RAW POWER DB WING-1
VIEW PARAMETER

HVAC
ENERGY METER
ALARM
LOG OUT
EXIT
LV S/W BOARD LOCATION-2
APFC
SPARE
DG PANEL WING-1
SOLAR PLANT 100 KWp
WORKER CANTEEN
SOLAR PLANT 18 KWp
KITCHEN DB
RAW POWER DB WING-3
SEWAGE PUMP
KITCHEN EXHAUST
BACKBONE
LANDSCAPE DB 1&2
BHUGAN INFRA
RAW POWER DB WING-4
HVAC WING-4
HVAC WING-1
HVAC WING-3
WARE HOUSE (BRDG. PUMP)
RAW POWER DB WING-1
VIEW PARAMETER
CCTV TwentySeventh Floor