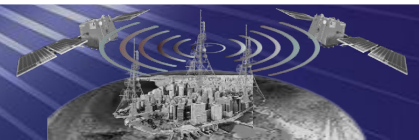


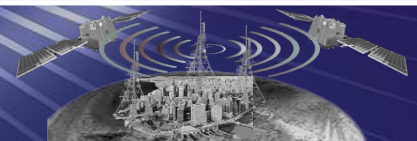
DESIGN STRATEGIES FOR EXPLOITING FIBER OPTIC AND 5G IN SMART CITIES

Speaker: Jhonny Villasmil
Sr. Telecom Engineer – From a Major
International EPC Corporation



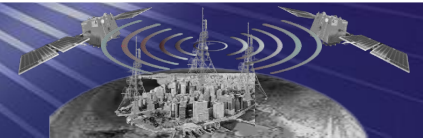
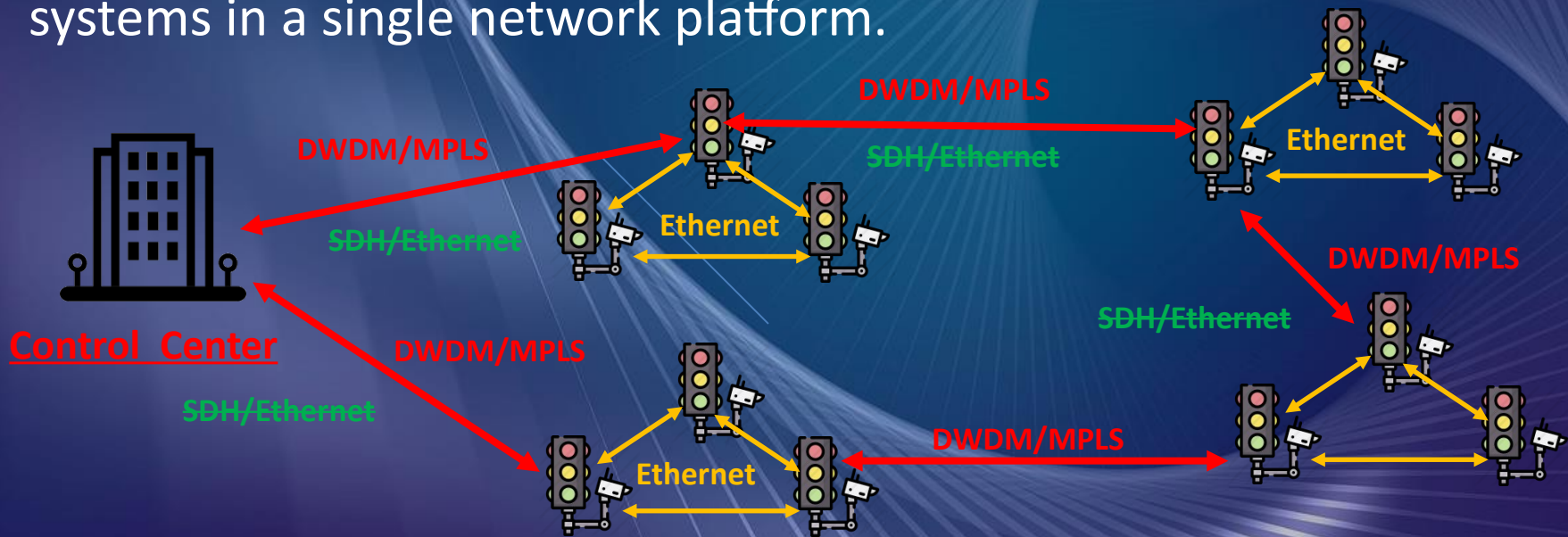
CONTENT

- **Revamping the existing Fiber Optic Links**
- **Exploiting 5G in a Smart City.**
- **Design Strategies for a Smart City.**
 1. Proposing new cell sites at existing and new areas.
 2. Systems which can benefit from 5G Technology.
 3. Options for the systems integration.
- **New Trends.**
- **Recommendations.**



Revamping the existing Fiber Optic Links

Most of the city municipalities have already installed wide fiber optic networks in its main highways, avenues and neighborhoods for transmitting data from transportation and security systems and those networks should be upgraded with the newest and converging technologies as DWDM/MPLS for achieving huge bandwidth which allows the integration of the existing and new systems in a single network platform.



Revamping the existing Fiber Optic Links

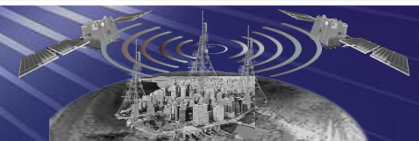
The revamped fiber optic networks have increased their capabilities in the key data transmission parameters such as:

Bandwidth: 40 – 100 Gbps, DWDM (previously 9953.28 Mbps with SDH, STM-64).

Max. Distances/Link: 140 Km at 1 Gbps (DWDM)
100 Km at 10 Gbps (DWDM)
60 Km at 40 Gbps (DWDM)
40 Km at 100 Gbps (DWDM)

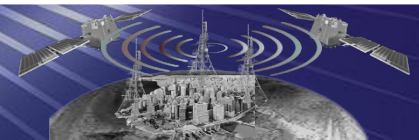
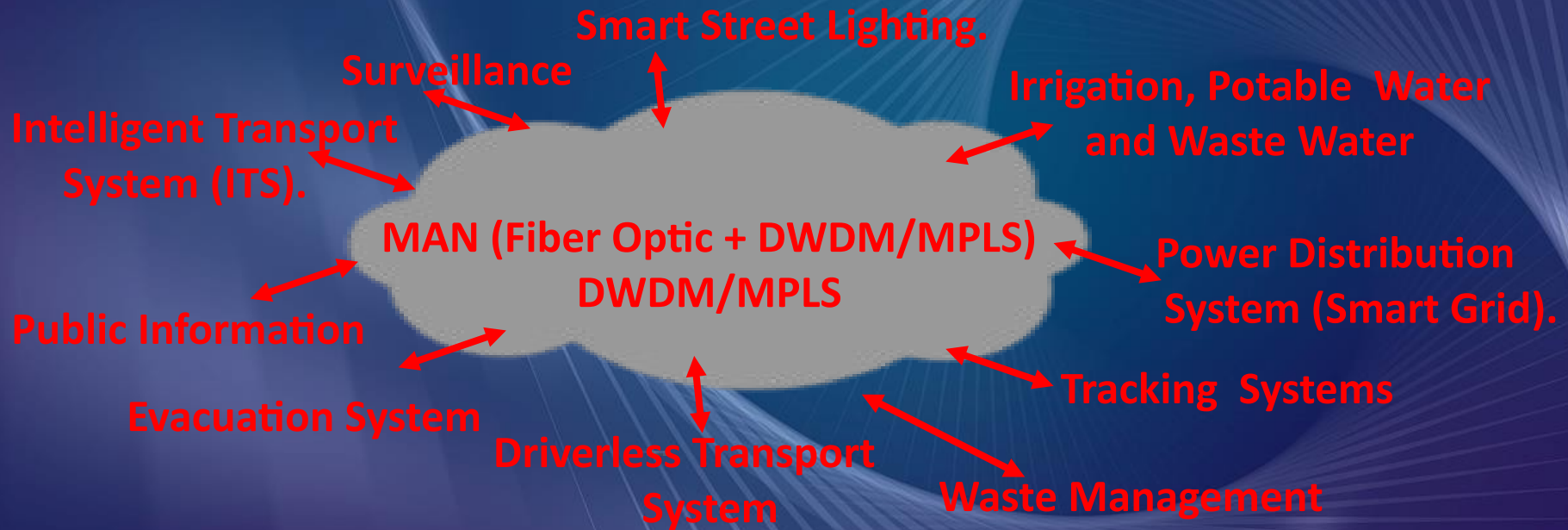
Reliability: 99.9999%, 30 Seconds/Year downtime

Redundancy: Full Redundant Fiber Optic Rings.



Revamping the existing Fiber Optic Links

The enhanced fiber optic networks used for transportation and security systems can additionally transmit data for a lot of new systems which are required to provide a Smart City framework, including its combination with all the new wireless technology such as 5G, LoRa, IoT, LPWAN ,etc.

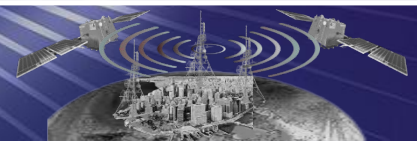


Exploiting 5G in a Smart City.

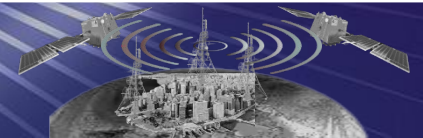
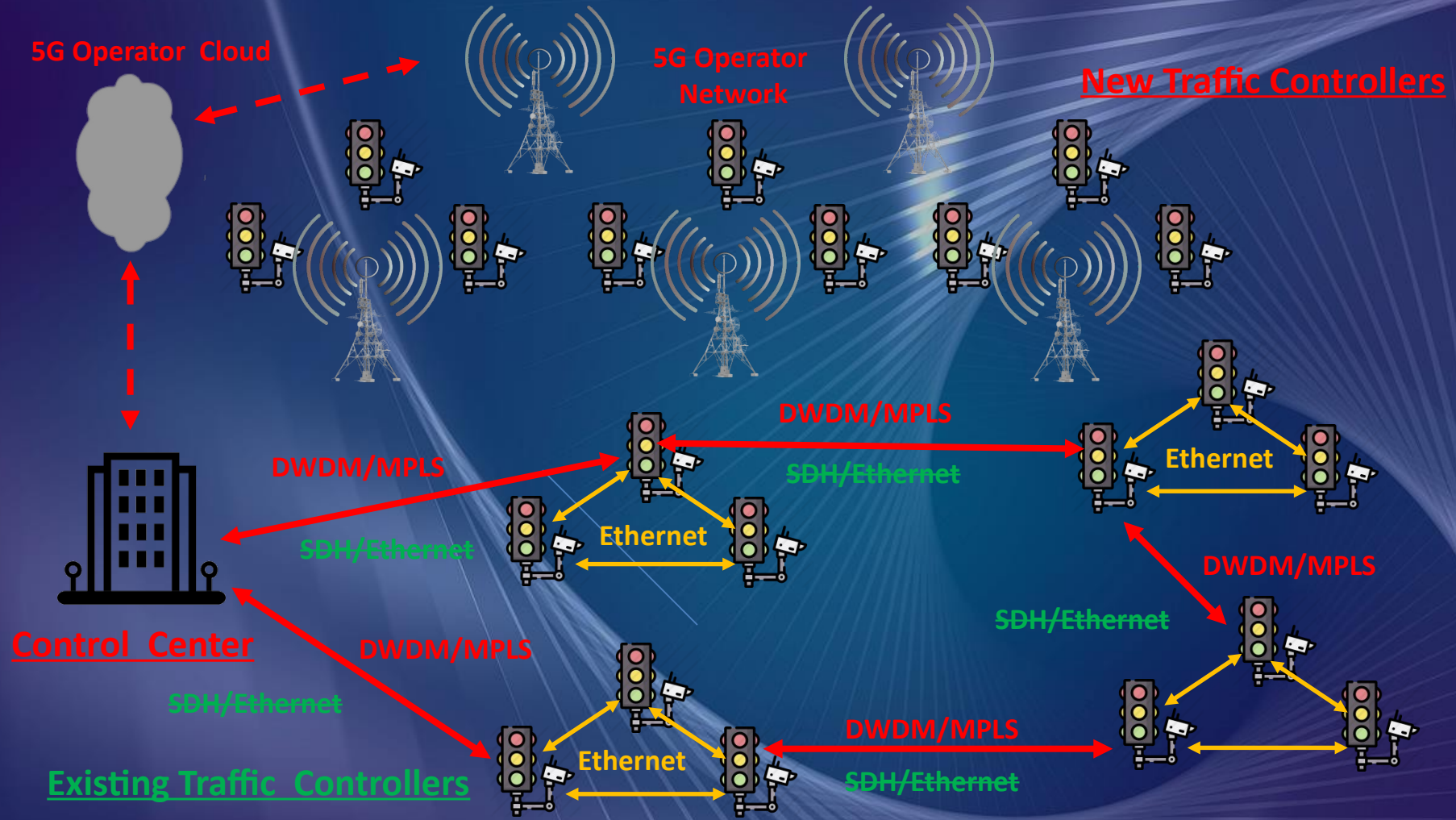
The faster growing of the biggest cities has originated the need for monitoring a lot of parameters for saving energy, reducing pollution, improving the traffic, maintaining utilities, etc. though a very comprehensive platform which behaves as the cities do it.

5G technology is improving some of the key parameters on the mobile networks which drastically benefit the Smart City Connectivity and Platform, such as:

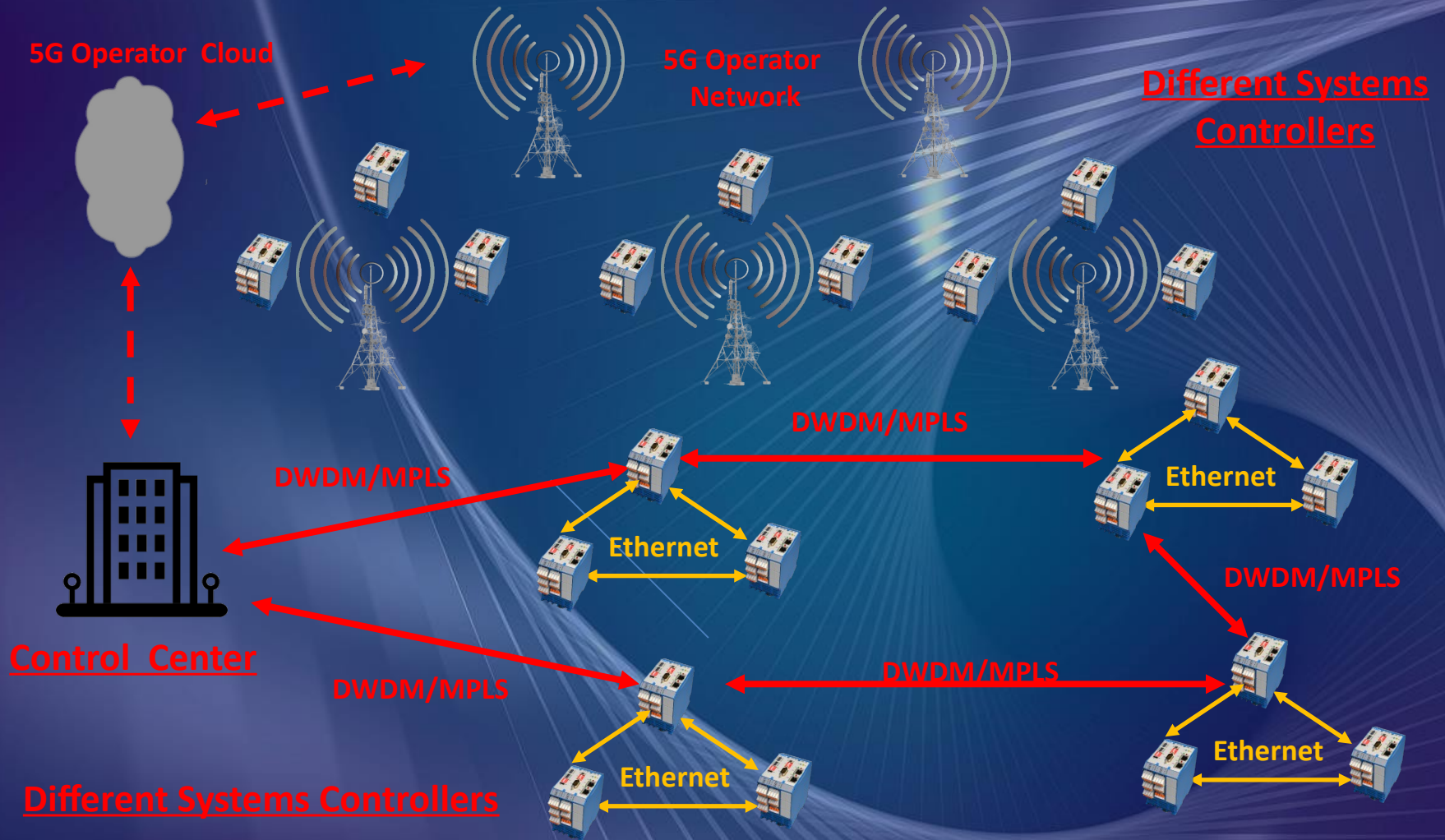
- Bandwidth: 10 Gbps+ Download / 1 Gbps Upload
- Latency : 1 ms
- Spectral Efficiency: 100 bps/Hz.
- Energy Efficiency: 15% savings.



Exploiting 5G in a Smart City for ITS

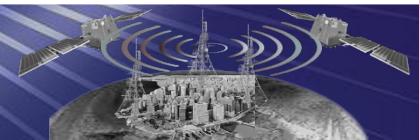


Exploiting 5G in a Smart City



DESIGN STRATEGIES FOR EXPLOITING 5G IN SMART CITIES

Speaker: Jhonny Villasmil – From a Major International EPC Corporation

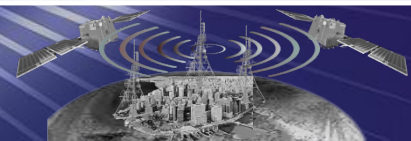


Design Strategies for a Smart City.

1. Proposing new cell sites at existing and new areas.



Original Cellular Coverage (LTE, 4G).



Design Strategies for a Smart City.

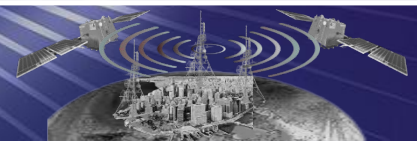
1. Proposing new cell sites at existing and new areas.



New Cellular Coverage (5G).

DESIGN STRATEGIES FOR EXPLOITING 5G IN SMART CITIES

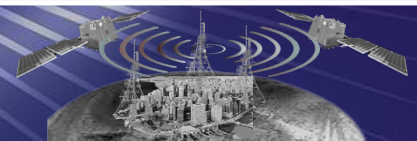
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Design Strategies for a Smart City.

2. Systems which can benefit from 5G Technology.

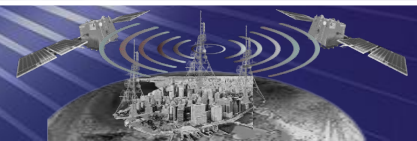
- Smart Street Lighting.
- Weather Monitoring.
- Intelligent Transport System (ITS).
- Public Video Surveillance.
- Irrigation, Potable Water and Waste Water Systems.
- Power Distribution System (Smart Grid).
- Tracking Systems.
- Waste Management.
- Driverless Transport System
- Evacuation System.
- Public Information System.



Design Strategies for a Smart City.

3. Options for the systems integration:

- A. Ethernet Gateways from all the different systems which allows the transmission of the data to the Centralized Municipality Control Center.
- B. Common Software Platform is the most recommended in order to have all the monitoring data and dashboards on unified screens, which allows an easier data management and reduce the training for the involved staff with the smart city at the Centralized Control Centre.
- C. Hiring specialized software company for integrating all the new installed systems for working with the Installation Contractor from the beginning.



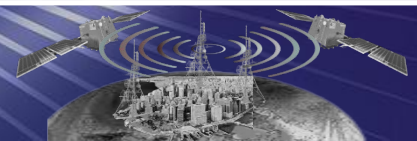
New Trends.

Exploiting the new wireless technologies for both wideband and narrowband for connecting the field devices (Controllers, Sensors, edge devices, etc.) to the Municipality Control Centers through the telecom services providers.

Saving the huge data amount generated by the Smart City Systems on the reliable clouds provided by some telecom services providers.

Involvement of the Vendors, Software Integrators and Telecom Services Providers from the beginning for the Smart City Projects.

Usage of statistic methods for determining which systems will be part of the Smart City and at which level.



Recommendations.

- A. **Upgrading the existing Fiber Optic and MAN Networks to the newest transmission technologies for providing the required bandwidth for the Smart City Systems.**
- B. **Usage of the existing MAN Networks owned by the Municipality Authorities in order to save cost.**
- C. **Connecting the smart city equipment in the new city areas through 5G or the available technology provided by the telecom operator in those areas, which reduce the CAPEX.**
- D. **Working together with the Municipality Authorities in order to define which data can be exposed or shared with the telecom operators, the data that cannot be exposed shall be transmitted through the own MAN Network to the Control Centers.**

