A Better Quality of Life with ITS, IoT, Smart Applications Driven by Hybrid Fiber-Copper

Innovations in Intelligent Traffic Systems (ITS), IoT, and smart applications are challenging existing infrastructure. This article will discuss these challenges and their potential solutions.

As rapid urbanization occurs, transportation authorities seek solutions to implement tomorrow's mobility and connectivity technologies—yesterday. However, significant challenges face the ITS and city networks supporting smart, IoT devices, applications, and the ensuing data to be shared and analyzed: time, cost, workforce, reliability, need for high-bandwidth, cybersecurity, and power. Fortunately, smart hybrid wireline and wireless solutions equip cities to effectively address these needs and bridge breakthroughs needed in ITS with a mix of fiber, existing copper and wireless networks.

The Need for Advanced ITS, IoT, and Smart City Technologies

Latest US census portrays dense, diverse and growing metropolitan areas. In the US alone, this trend has added 8.8B hours of travel time and 3.3B gallons of fuel usage—and traffic was already bad enough, thank you very much. Small wonder, then, that governments are investing in transforming existing ITS networks to align with Smart applications and IoT technologies. Environmental, social, and economic sustainability—and our collective driving sanity—must be improved during these urbanization trends. Clearly it should be mentioned that the impact of Covid-19 on people's commute and place of living workforce is anticipated to be transient.

Benefits to the Consumer

- Improved Mobility Reliability and Safety
  - Increased traffic regulation compliance
  - First responder monitoring and access
- Reduced Road Congestion
- Increased Convenience & Affordability of Transportation
- Real-time Information
  - Traffic and Weather Updates
- Environmental Benefits
  - Decreased fuel usage
  - Better air quality, reduced carbon footprint
- Integration with Mobile Applications (5G)
  - Parking meters and finders
  - EV charging
  - Electronic toll collection systems (ETC)
- Reduced Transportation Costs

Benefits to Transportation Authorities

- Management Flexibility and Effectiveness of increasingly complex and vast roadways
  - Incident management (accidents, severe weather, fires)
  - Efficient incident response
  - Ease of Installations + Repairs
- Real-time Roadway Monitoring
  - Video camera and sensors
- IoT Applications
  - Connected traffic lights
  - Public transportation monitoring
- Reduced Infrastructure Damage
- Greater Traffic Regulation Compliance

Aspects of Successful ITS and Smart City Infrastructure

Several factors make for successful ITS and Smart City deployment: **Open Data Exchange** between all transportation management departments is necessary for effective telematics. In addition, **Pervasive High-Speed, Reliable Network Connectivity**—wireless or wireline—is essential to connect to all existing and new sources of information for ITS, Smart, and Mobile applications. And, **Cybersecurity** is critical to protect consumers' personal information and secure vital backend management and transmission systems from intrusions.

The Difficulties of Integrating ITS with IoT and Smart Technologies

* The Current Infrastructure

Current infrastructure is a mish-mash of new fiber, copper (available everywhere, but low in performance and not secure), and wireless (needing line of sight and not secure) —each with its specific benefit and limitations.

* Obstacles Facing Fiber

Fiber is an incredible media with many benefits—if it's available. But for many hard-to-reach locations it is cost prohibitive, very time consuming, and sometimes impossible.

* Financial Capital

With rapid urbanization, there's an increasing need for financial resources to fund and enable growing and smarter ITS networks. There's also an urgent need for advanced operations centers and more field technicians to help maintain and manage these networks.

* Cybersecurity and Encryption

As Infrastructure continues to digitize, and cyberattacks grow exponentially, Cybersecurity has become vital to keeping people and data safe—physically and digitally. Improvements in critical ITS infrastructure will help save lives—with effective first responder access, real-time incident updates—whereas network breaches may harm them. Personal data—IDs and financial information for mobile payment—will also be vulnerable.

* Bandwidth

There's an ever-growing number of video cameras, IoT, Vehicle-to-Vehicle, and Smart devices on the road, all of which need high-bandwidth connectivity.

* Workforce, Management, and Automation

ITS networks are overburdened by the significant increase of network IoT elements that need management, transmission, effective analysis, maintenance, and installation. These increasing needs mandate a larger workforce. Automation, zero-touch provisioning, and remote monitoring would simplify, cost-optimize, and streamline the management and use of growing data points.

The Solution: Driving ITS, IoT, and Smart Tech with Hybrid Fiber-Copper

There simply isn't one solution that supports every ITS need. The challenge, therefore, is using a mix of existing and new infrastructures, which allows cities to reach the coverage, connectivity, and support required everywhere, while optimizing costs and time for deployment.

Increasingly, cities consider advanced hybrid fiber-copper technologies. New copper technologies bring gigabit-speeds and are reliable, cyber-hardened, and able to connect *and* power IoT devices and 4G/5G base stations. Hundreds of cities, and major highway authorities globally, successfully deployed new Fiber to easy-to-reach locations, while using the already-in-place copper, enhanced by advanced technologies, for hard-to-reach locations, saving more than 50% of time and budget.

With the advancements in hybrid fiber-copper solutions, cities can implement high-bandwidth ITS applications *today.* Using fiber extension solutions built on existing fiber and copper networks that connect and power is cost- and time-effective, topographically and climate flexible, cyber-secure, and reliable— helping cities unlock the hidden value of existing networks.

The Tech

Hybrid fiber-extension solutions can power devices (cameras, sensors, 5G base stations etc.) and provide high-speed, secure, fiber-like service over existing long wires. Equipment is easily installed in standards-based, temperature-controlled 19” racks and non-temperature- controlled roadside cabinets, connectable to IP, legacy, serial, and SCADA interfaces.

With these solutions, ITS networks utilize Advanced QoS, and data prioritization renders minimum delay and variation. In addition, the use of high-end, cutting-edge encryption such as the 256-bit MACsec maintains the security, integrity, and reliability of sensitive applications such as CCTV, control signals, and smart signs. And, zero-touch provisioning and remote management make scheduling tasks, updates, and new installations cost-, time-, and workforce-efficient.

By transforming our existing networks into those that can bolster new ITS, IoT, and Smart City technologies, we can implement these solutions today. Actelis innovative hybrid-fiber copper solutions have been accelerating the development of more than 350 ITS, worldwide, offering cost optimized, highly reliable solutions enabling immediate support for today's and future needs.

* Ubiquitous high bandwidth, aggregated surveillance, network-wide over fiber and to locations beyond fiber reach
* Cutting-edge security: 256-bit MACsec encryption assuring data protection, integrity & a trusted path between connection points
* Centralized remote configuration, automated resiliency and failover
* NEMA TS2, tailored to city streets, bridges, tunnels and highway installations
* Tested & approved for deployment by New York Department of Transport

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