



To truly enter the digital age and become smart cities, municipalities need to install thousands of video cameras. This, alongside with recent advancements in video analytics and artificial intelligence will shape the smart-city in the coming years - preventing crime, managing infrastructure and resources, controlling traffic, locating parking spaces, alerting people of hazards, etc. In the event of accidents and natural disasters, cameras will be instrumental in saving lives.

Telicomm at a glance

- **Established in 2017**
- **Number of employees: 14**
- **Headquarters is Tel-Aviv, Israel**
- **Fund raised – \$1.5M A round (VC, private investors and Government)**
- **First commercial project in Tel-Aviv**
- **First pilot projects in Europe and Latin America**



>12 million
new cameras every year

23%
annual growth

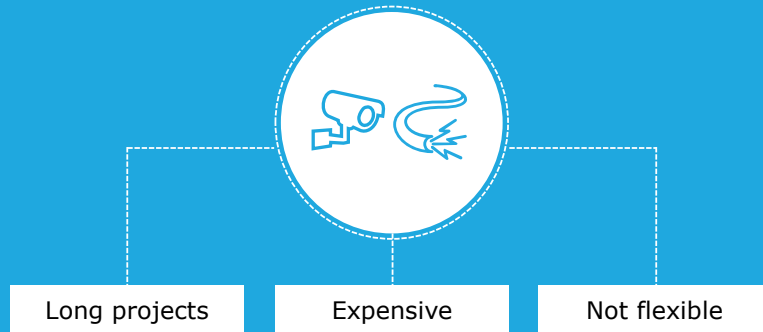
Market size
in 2025 - \$78B



The market size research is based on the list of articles attached (CCTV Cameras by City and Country.xlsx)

The connectivity of the camera installation market estimation for 2025 is \$78B

Today



Most of these projects (over 90%) involve cumbersome, expensive and non-flexible cable installations: using cables to connect the cameras to the city high-speed-backbone (80m of cabling an average, AKA the “last mile gap”) and to the control-center.

These projects involve trenching roads and sidewalks, take months or even years to complete, are extremely high cost (the cost for connecting a single camera is approx. \$6,000, while a high-quality camera costs \$200) and cannot be forward-looking to the future development of the city.

The need: Plug & Play solution



Immediate
installation



Total
flexibility



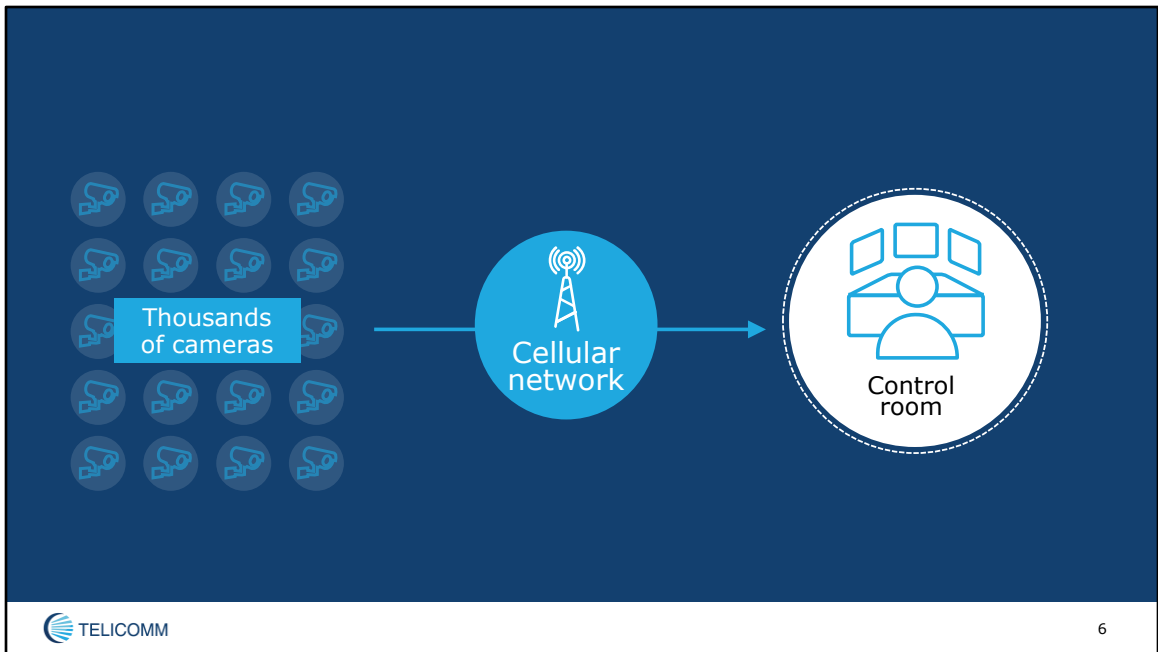
Fully
scalable



Low
cost

To answer the above need for today's and tomorrow's rapidly changing cities, an **immediate, flexible, and cost-effective solution for connectivity of thousands of cameras is a must.**

Industry experts estimate that if the cameras installation process will be cheaper, quicker and more flexible, the volume of installed cameras will increase significantly.

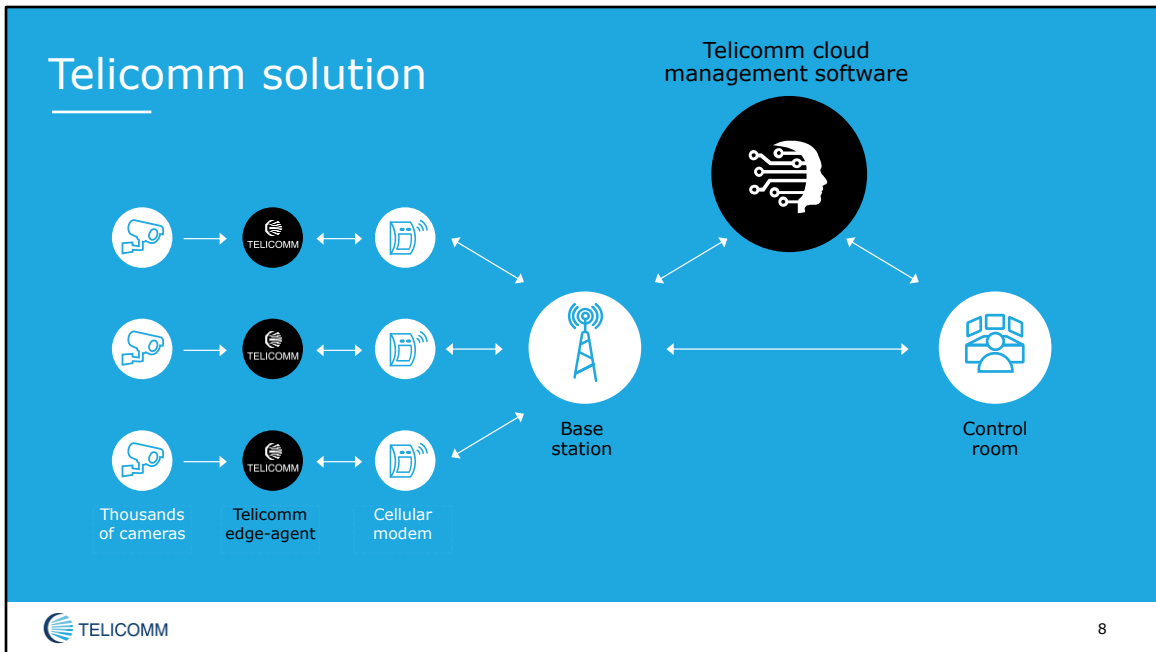


This can only be done by plug & play solution over existing network – **The cellular network.**

The problem



- Due to the limited bandwidth of the cellular network, it cannot support mass number of high-quality camera connectivity.
- The 5G cellular standard opens new frequencies and increases overall bandwidth, but it doesn't improve the uplink to the required rate for camera connectivity (validated by Nokia and Ericsson). Due to increased camera resolution and higher number of users and applications, the bandwidth limitation will remain an issue in 5G networks.
- At the same time, since 5G significantly improves the robustness and reliability of the cellular network, many customers will prefer to connect IoT, sensors and cameras over cellular. **This opens a huge business opportunity for Telicomm:** once 5G is there, Telicomm will enable the video connectivity over the cellular network
- Telicomm is launching now a pilot with Cellcom (Israeli 1st tier Cellular operator) on **5G network.**



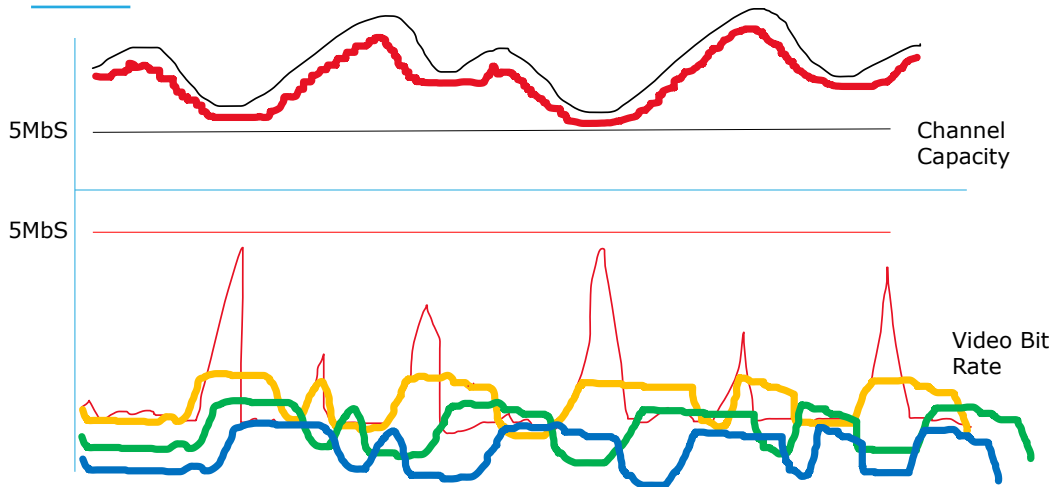
Telicomm’s unique P-VAN™ (Predictive Video Aware Network – patent pending) technology utilizes machine learning combined with signal processing algorithms to optimize the video transmission from all connected cameras over the cellular network. This is done by predicting – in real-time and ahead of time – the behavior and needs of all video streams captured by the cameras, together with the condition of the cellular network, and using *unique* signal processing algorithms to fit all video streams into the available network resources

The solution is software and comprised of two entities:

Edge-Agents: Connected between the camera and the cellular modem. Perform sensing, processing and control in both video and wireless domains.

Cloud Management Software: This is the brain of the system, utilizes the information from all Edge-Agents to gear the P-VAN™ algorithm and manage the system
See attached doc. Re. Telicomm IP.

Telicomm P-VAN Technology



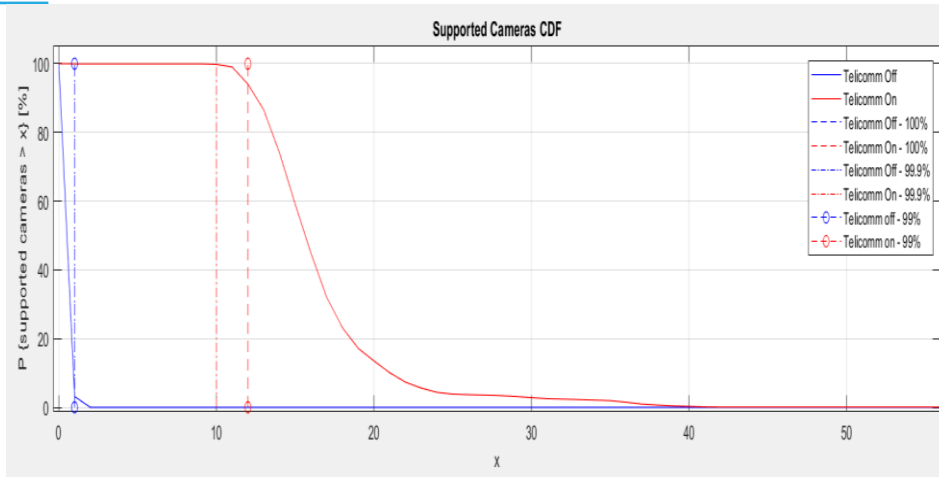
Top Graph – Cellular channel capacity

- None managed system will limit the bitrate to the lower boundary of the capacity
- Telicomm solution (in red) adapts and follows the cellular capacity

Low Graph – Video bit rate

- None managed system peaks (in red) exceed the channel capacity causing video to collapse
- Telicomm solution flats, synchronized the peaks and reduce video average bit rate to fit the video into the cellular channel capacity

Telicomm P-VAN Technology



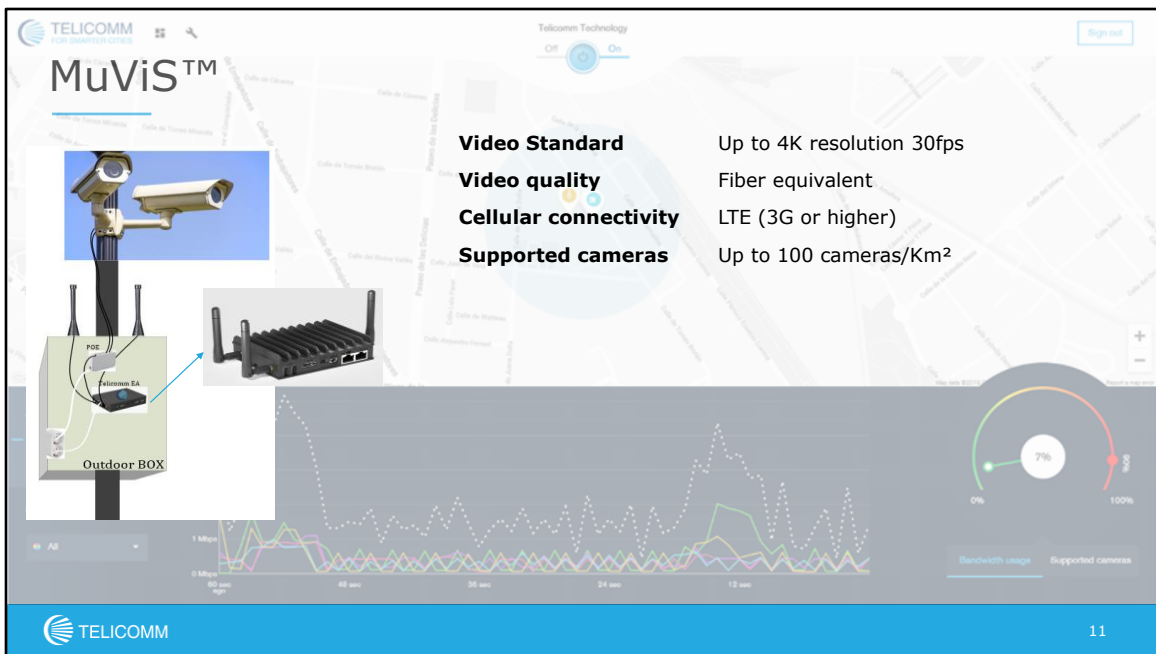
Data analysis of operation system installed in Tel-Aviv (Israel)

X-Axis number of cameras connected to single cell

Y-Axis probability of receiving good frame

- None managed system (in blue) – connecting more than 1 camera will cause the collapse the video
- Telicomm solution (in red) – 10 cameras successful connected with graceful degradation.

Telicomm technology is x10 better than none managed system



Simple Plug & Play installation !

Connect the cameras via RJ45 to POE switch and Telicomm Edge device.

“Turn on” the system -> The cameras are automatically connected to the control room.

Telicomm Usage Model



Last mile cable replacement

Save costs of cable installation and maintenance. Reach the same functionality without getting into expensive tunneling and cabling projects.



Mobility & transportation

Reliable live video stream from buses, trains, cabs, and ridesharing vehicles.



Fiber-less areas

Connecting cameras on a cellular network is the only solution for a huge market that doesn't have alternatives such as small cities, rural areas, farms, etc.



Ad-hoc deployment

Fast assembly and disassembly of visual coverage at sports events, developing news, concerts, and other one-time needs.

The team



Shlomi Arbel
Co-Founder & CEO
Entrepreneur,
Technologist,
Executor



Boaz Or-Shraga
Chairman

Served as VP of Biz Dev
in Elbit, Head of Sales at
Motorola Israel



Lior Ophir
Co-Founder & CTO

Video Processing, DSP
and Communication



Roy Matas
VP Marketing & Biz Dev

Biz Dev, sales, and
product marketing



Erez Kedem
VP Technology

Expert in development
of telecom, networking
and internet products



Sigalit Arbel
VP Operation and HR

Biz Dev in HLS,
security and defense
industry



Project successful results:

Video quality ACR-MOS > 4.5

Video continuity Frame loss < 10^{-7}

Cellular BW usage Peak usage <= 90%

Supported Cameras >= 20 (single cell)



6 years after winning the title **Best Smart City in the World** in the Smart City Expo World Congress in Barcelona In 2014, Tel-Aviv municipality decided to improve the urban security and traffic control by installing 5,000 new cameras. Telicomm technology is the only available solution today that enables plug&play installation over the cellular network.



Thank you
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