

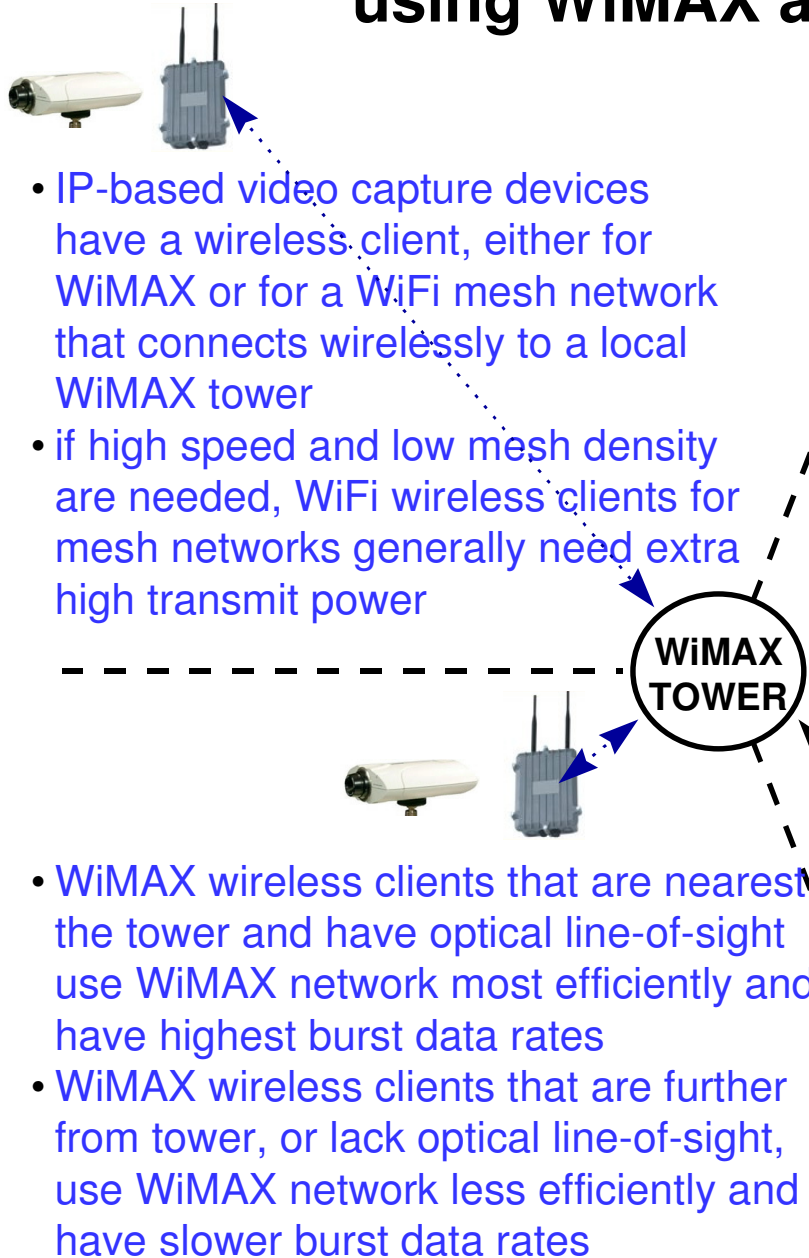


# Conventional IP-based Digital Video Surveillance Systems Flood WiMAX and Mesh Networks but the *Advanced* IP-based, Ultra Low Bandwidth, ***Boundless Security System™*** Does Not





## Basic IP-Based Digital Video Surveillance System Architecture using WiMAX and Optionally, a WiFi Mesh

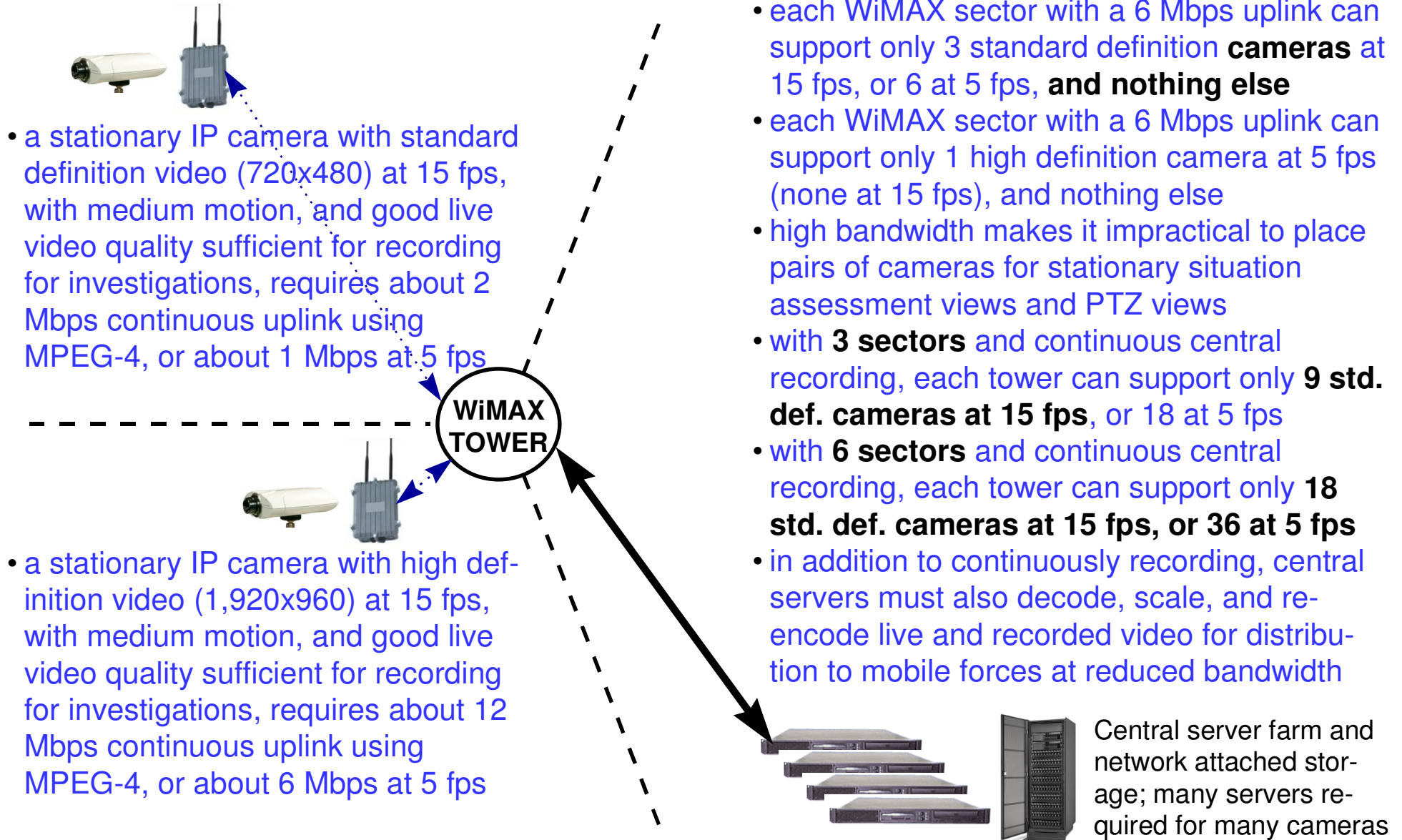


- each WiMAX tower can have 3, 4 or 6 sectors, each with a range of several Km and a mix of optical line-of-sight (fastest) to non-line-of-sight (slowest) wireless clients
- each WiMAX sector, when optimum modulation is used with nearest wireless clients, can support a total uplink and downlink of about 19 Mbps of IP-packet traffic
- WiMAX packet traffic in each sector is configured between uplink / downlink as either 25% / 75%, 50% / 50% or 75% / 25%
- with a 50% / 50% configuration, 85% utilization, and several near and far wireless clients, a total of 6 Mbps uplink packet traffic from all devices in a given sector can be sustained if sufficient backhaul is provided
- total backhaul speed required to support maximum traffic is 57 Mbps for 3 sectors to 114 Mbps for 6 sectors

**high speed fiber optic or wireless backhaul to Internet or city loop**



## Conventional, High Continuous Bandwidth, IP-Based Digital Video Surveillance System Architecture using WiMAX





# Boundless' Ultra Low Bandwidth, Distributed-Storage, IP-Based Digital Video Surveillance System Architecture using WiMAX



- Boundless' ultra low bandwidth, **Multi-Stream Video Server** in outdoor housing continuously internally records 4 standard definition CCTV cameras at 5 and 15 fps at multiple resolutions, and only provides live or recorded video on demand; typical live stream is only 128 Kbps



- As an option, Boundless' ultra low bandwidth, **Multi-Stream Video Server** in outdoor housing continuously internally records 2 high definition digital cameras at 5 fps at multiple resolutions, and only provides live or recorded video on demand, typical live stream is only 128 Kbps

WiMAX  
TOWER

- Boundless places no static video traffic on the network -- entire WiMAX network capacity is available for other uses
- each WiMAX sector with a 6 Mbps uplink can support typical live streams from 48 standard definition cameras simultaneously at 15 fps
- optional use of high definition cameras does not place any additional load on the network because recording is internal to Boundless' **Multi-Stream Video Servers**, and live video is typically viewed at lower resolution
- Boundless' ultra low bandwidth makes it practical to use pairs of cameras for stationary situation assessment, and PTZ views
- with **3 sectors** and continuous distributed recording, each tower can support typical live video from **144 cameras simultaneously at 15 fps; 6 sectors support 288 cameras**



Boundless' **Tunneling Broadcast Servers** are video distribution points, Cyber security gateways, and optional archive points, and provide automatic, large scale, video system configuration (no IP setup of **Multi-Stream Video Servers** or routers required). A few Broadcast Servers can handle many cameras.



## Comparison Table of Conventional IP-based and Boundless' *Advanced* IP-Based, Digital Video Surveillance Systems using WiMAX and Optional Mesh

	<b>Conventional</b>	<b>Boundless</b>
<b>Architecture</b>	bandwidth-wasting, continuous video streaming	bandwidth-saving, video-on-demand with multiple different streams per camera
<b>Video Storage</b>	centralized, requires continuous video at high data rate on WiMAX network	distributed, edge-based, avoids continuous video on WiMAX network
<b>Reliable Recording</b>	no, lost if network fails	yes, network independent
<b>Max. Std. Def. Cameras @ 15 fps per 6-Sector Tower @50/50 Up/Down</b>	18, quality of recorded video only as good as quality of live video	more than 288, qualities of live and recorded video are independent
<b>High Def. Cameras</b>	not enough bandwidth	yes (optional)
<b>Uplink Bandwidth for Other Applications</b>	little or none, video typically consumes all	yes, no static video traffic required for recording
<b>PTZ Camera Pairing</b>	not practical	yes, improves PTZ use
<b>Self-Configuring</b>	no	yes, improves security
<b>Central Servers Rqd.</b>	many for many tasks	a few for network mgt.
<b>Mesh Density (optional)</b>	high density required	high density not required