



UPLOAD ANYWHERE ANYTIME: IN-CAR VIDEO LTE UPLOAD GUIDE

FOR PLANNING AND IMPLEMENTING 4RE® IN-CAR AND VISTA®
BODY CAMERA UPLOAD OVER CELLULAR LTE CONNECTION



Overview

This document describes the technical requirements and implications for implementing video upload over a cellular data link in vehicles equipped with a WatchGuard 4RE in-car camera system. (If a vehicle is equipped with a VISTA WiFi body camera and WiFi base/dock, its video will be uploaded over the cellular data link as well).

The target audience for this document is WatchGuard customers who are interested in incorporating this capability into their vehicle fleet.

The objectives of this document are (1) to explain the potential benefits of uploading video over cellular data link and (2) to describe the configuration options and requirements for a successful implementation.

This document covers the main points, for the best experience we recommend a full network diagram be created for your agency's connectivity.

Benefits of Uploading Video over Cellular

If an agency meets the requirements and recommendations for uploading video over cellular, they can experience the following benefits:

- Vehicles will need to return to a central location to upload video over WiFi less frequently and for shorter durations or eliminate the need to upload over WiFi at all.
- Video evidence will be available sooner in Evidence Library, so Administrative staff can view events soon after the incident occurs without the vehicle coming back to the station.
- For take home vehicles, reduces the time to upload video from the parking lot.
- If uploading cellular only, it cuts down on necessary network infrastructure for traditional 802.11 Wireless networks.
- If utilizing FirstNet, your agency's evidence gets priority on the bandwidth.

Potential Downsides

Potential downsides of implementing video upload over cellular data link include:

- The cost of equipping vehicles with cellular routers or cellular data link service may be prohibitive to some agencies.
- The additional load on vehicle systems may be unacceptable. This includes the total usage of the cellular data link as well as possible additional loading on the Mobile Data Computer and its data link. (Note: PC applications can be used on an MDC to manage the processing load and cellular data link usage and potentially resolve any issues related to the additional load).

- The cellular service provider may throttle cellular data when some threshold is reached (i.e. after uploading 50 GB of data for a given pay period, the upload speeds drop from 10 Mbps to 0.5 Mbps). The addition of video uploading onto the data link will cause throttling to occur more often/sooner.

Key Points

Here are the key messages addressed in this document.

1. **Cellular upload of video is entirely dependent on the bandwidth provided by the desired cellular service provider across a geographical region.** This bandwidth can vary widely and, in some cases, may not be sufficient to provide significant benefits.
2. There are many possible vehicle configurations to support video upload over cellular data link, but **only a specific set of configurations that have been validated and are supported by WatchGuard.** Configurations other than those recommended will require testing and verifying in the field by your agency and may have ongoing technical obstacles to overcome in order to have a viable implementation.
3. If your agency has **vehicles outfitted with an Ubiquiti Bullet (shown below) WiFi radio**, you must either:
 - a. Use a cellular router which provides both WiFi and cellular data links (such as the cellular routers recommended in this document) or
 - b. Replace the Ubiquiti Bullet radio with a MikroTik Groove radio to upload video via WiFi, incorporation with an MDC/Laptop with cellular connection
4. **Re-configuration of the cellular router** may be required to utilize both cellular and WiFi data links (setup is required for WiFi path and priority/switching).



Requirements

1. 4RE in car system with the following items:
 - a. Smart Power Switch (SPS)
 - b. 4RE firmware version 4.0.7 or higher
 - c. Run WatchGuard provided scripts on 4RE via USB drive
 - d. Optional: VISTA WiFi docking base if uploading video
2. Cellular device via one of the following device types:
 - a. Mobile gateway device (examples: Sierra Wireless, CradlePoint)
 - b. Laptop/MDC with an Internet connection via MiFi or embedded SIM card – will require PowerShell scripts to run on laptop (Windows 10 recommended)
3. Cellular SIM and data plan: WatchGuard recommends purchasing a plan that will not throttle speeds
4. Evidence Library Configuration:

- a. If using On-Premise Evidence Library –
 - i. Evidence Library 4.2 or higher
 - ii. Option 1 – Encrypted upload over the Internet:
 1. Provide a public **static** public IP address or public DNS Name and open TCP ports: 5002 and 9145
 2. Install and configure stunnel
 - iii. Option 2: Encrypted over a VPN to Evidence Library Server
 1. VPN client on cellular modem or MDC
 2. VPN on Evidence Library Server

- b. If using EvidenceLibrary.com (Cloud Hosted Solution)
 - i. Option 1: WatchGuard will host an upload server in the Azure Government cloud and configure stunnel (may be additional cost)
 - ii. Option 2 - Encrypted upload over the Internet
 1. Provide a public static or public DNS and open TCP ports: 5002 and 9145 for the upload appliance
 2. Install and config stunnel
 - iii. Option 3: Encrypted over a VPN to Upload Appliance
 1. VPN client on cellular modem or MDC
 2. VPN client Upload Appliance
 3. VPN connection to the Evidence Library Server

Caveat: VISTA WiFi “cellular upload” is not an option with the **On-Premise** of Evidence Library configuration until version 5.1 (ETA: Summer 2019).

Is Your Agency a Good Candidate for Cellular Upload of Video?

There are numerous variables involved when implementing a cellular upload capability into your vehicle fleet. Among these variables are things like type of cellular router/modem, cellular service provider, cellular service type, cellular service geographical variations, agency security requirements, and agency policies.

This document is intended to help your agency understand the potential benefits of implementing video upload over cellular data link as well as any associated risks or difficulties you may encounter. This will enable to your agency to make an informed decision about how to proceed with this capability.

Here is a high-level overview of what makes a good candidate for implementing video upload over cellular data link.

An Agency is a Good Candidate if:

- It understands the technical limitations of uploading video over cellular as explained in this document.
- It uses one of the WatchGuard supported cellular routers or one of the WatchGuard supported MDC/cellular modem combinations.

- It uses the WatchGuard recommended system configuration (as described in this document).
- Its cellular service provider has good upload speeds and signal coverage over the agency's geographical service area.
- Its policies are supportive of uploading video over cellular data link.

An Agency is a Potential Candidate if:

- It uses a configuration other than the WatchGuard recommended configuration but is willing to do some testing and experimentation to determine whether their configuration will support video upload over cellular in a satisfactory manner.

An Agency is Not a Good Candidate if:

- It has overly optimistic expectations for the performance of video upload over cellular which are beyond the technical limitations of the system. (This document is intended to help avoid this situation).
- It uses a configuration other than the WatchGuard recommended configuration and is unable to achieve satisfactory performance from this configuration.
- Its cellular service provider has poor upload speeds and signal coverage over the agency's geographical service area. Use speedtest.net or other speed tests in multiple areas in your area of patrol to confirm speeds.
- Its policies are not supportive of uploading video over cellular data link.

Estimating Potential Improvements in Video Upload

Given the many variables involved, it is not possible to accurately predict the performance gains that may be experienced by implementing video upload over cellular. To fully determine actual system performance, technical measurements must be made in the field under live operational conditions.

The **most significant determiner** of how much video can be offloaded using the cellular data link is the **available bandwidth from the cellular service provider**. This bandwidth can vary widely across a geographical region and is independent of signal strength (bandwidth may be low even when signal is strong). When the upload bandwidth is consistently ample (say 15Mbps or higher) across a service area, it is possible for most or all of a vehicle's recorded video to be uploaded using only the cellular data link. However, the upload bandwidth is often much lower and can vary widely across the service area to a point where little or no video may be uploaded in a given time.

Here are some online tools to see cellular providers and their coverage with 3G or 4G:

<https://www.whistleout.com/CellPhones/Guides/Coverage>

4G/LTE or 3G?

Is 3G enough, or does your agency need 4G/LTE?

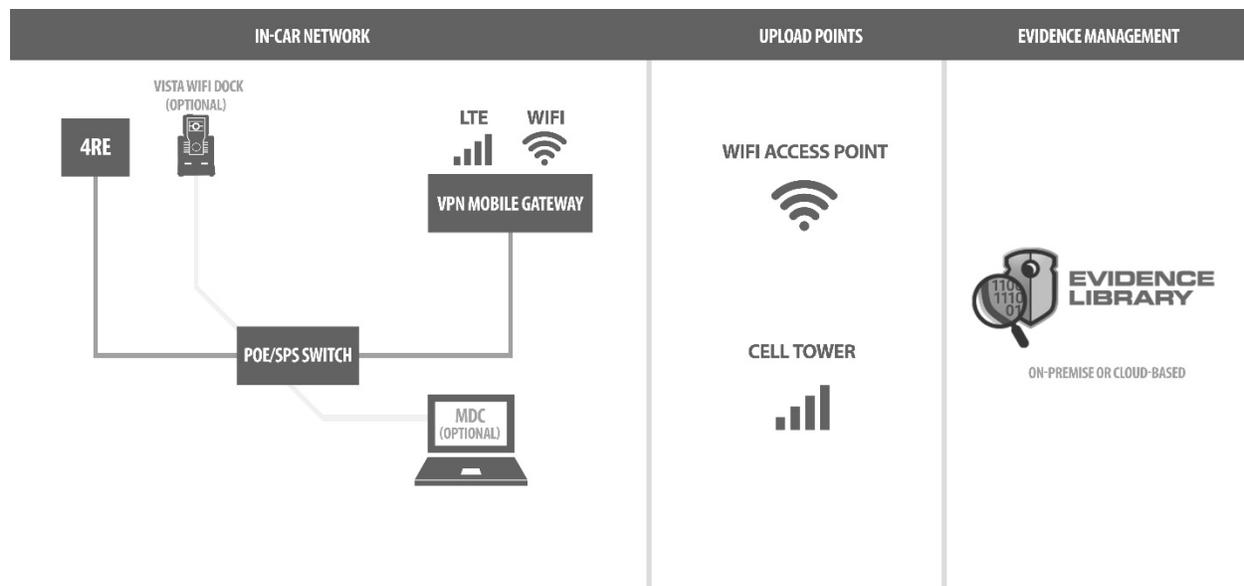
The faster speeds are better, as it gets the video uploaded and viewable faster. 3G **theoretical** maximum speeds are [about 21 Mbps](#). With a moving vehicle, those speeds are drastically decreased (sometimes down to 300 Kbps). On average, WatchGuard has seen between 300Kbps and 3 Mbps with a 3G connection. Each provider will be different. The 4RE in-car system or VISTA body camera can upload with those speeds between 1 and 3 Mbps. However, the amount of data created will need to be **monitored closely**. WatchGuard recommends that a WiFi connection is also used in this configuration to allow upload to finish in a WiFi hotspot area.

[FirstNet](#) is another tool to help with uploading video. If utilizing a FirstNet SIM card, the upload speeds can be more consistent. The WatchGuard system is compatible with FirstNet.

Recommended Configurations

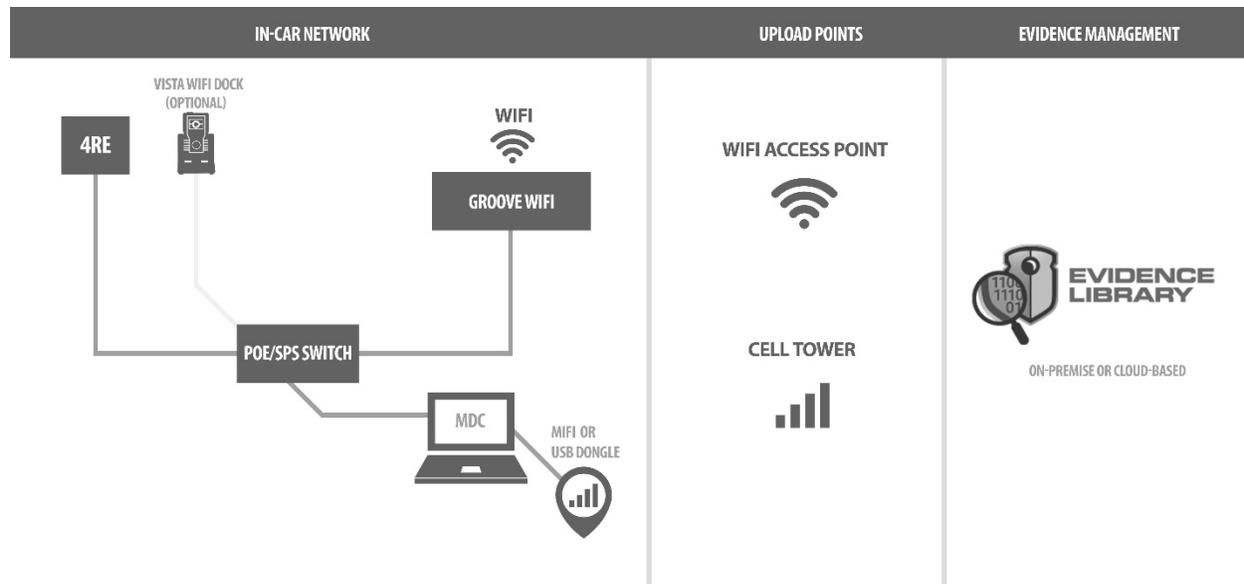
There are two main system configurations to support video upload over cellular data link. The physical components are similar, but there are different ways to implement this configuration.

The first configuration uses a mobile gateway or dedicated modem with Ethernet ports. This option is desirable for customers who are looking to add mobile gateway devices (e.g. Sierra Wireless MP70, MG90, Cradle Point IBR900) or already have a similar device. The 4RE in-car system would connect via Ethernet to that device. The mobile gateway would try to connect via WiFi first, and if it isn't available, connect to the cellular tower instead for uploading video. Then it would upload to the backend video management system Evidence Library.



The second configuration uses the MDC with a USB dongle, embedded SIM card, or “MiFi” device. The second configuration is desirable for agencies with a low budget for cellular upload and would like to keep the in-car hardware the same or with a minimal change.

The 4RE in-car system would be configured to connect to the MikroTik Groove client for upload via WiFi and the laptop for cellular upload. The system is configured to connect to agency’s WiFi access point via MikroTik WiFi radio, and if WiFi isn’t available, then connect to the cellular tower via the MiFi or other cellular connection for uploading video. Then it would upload to the backend video management system Evidence Library.



Encryption Configurations

Since most of the video uploading is evidence, the system is designed to upload the video with encryption. The encryption can be done by two different methods:

Method 1:

- [Stunnel](#) as the encryption method. WatchGuard would install and configure this option.
 - A FIPS 140-2 compliant application to encrypt upload traffic.
- WatchGuard Technical Services can help on the implementation plan.

Method 2:

- Utilize a VPN for the encryption method.
- The VPN client would be installed on the mobile gateway device or on the MDC laptop.

Questions?

Contact us to see if cellular upload technology is right for you.



(800) 605-6734

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