Best Practices for Installing Verkada on Buses and Other Forms of Transportation

Customers have installed Verkada cameras in a wide range of buses and emergency vehicles. This document outlines requirements and best practices for successful transit deployments.

Requirements

Vehicle installation requires the following:

1. A PoE switch compatible with the vehicle's power source.
2. A mobile router to provide the switch with connectivity to a WiFi or cellular network. Note that a SIM card and data plan are required for cellular connections and necessary for live viewing.
3. Either cloud backup OR an uninterrupted power supply to access footage when vehicle is turned off.

Suggested configuration

Cradlepoint IBR900 router for network connectivity

The IBR900 can use a SIM card (sold separately) to provide a 4G connection. It can also be configured to connect to a WiFi network, or a set of WiFi networks, to deliver enhanced bandwidth when the device is in range. In our school bus deployments, the Cradlepoint connects to the bus yard WiFi while idling and near the yard, and fails over to the 4G connection when out of range. The 4G connection allows for live viewing and simultaneous cloud backup while the bus is en route, and the WiFi connection helps ensure footage can finish backing up to the cloud when the bus is close to the yard.

Veracity camswitch mobile for PoE Power

Traditional PoE switches are not compatible with vehicles' DC power source. This Veracity mobile switch can power up to 8 cameras / 80 Watts and is compatible with 12V/24V DC vehicle batteries. The switch is wired directly into the battery or power studs through power + ground wires (not provided).

SIM card with unlimited data plan for 4G data

An unlimited data plan is typically most cost-effective if cloud backup is enabled (see below), or if the user will be consistently viewing live feeds. Our deployments have used SIM cards from OTR Mobile, which provide an unlimited data plan on the AT&T network for $60/month. Some schools, municipalities, and businesses have partnerships with providers and can get SIM card and data plans at lower cost.

Cloud backup

We recommend that cloud backup is turned on for all cameras, so that the cameras are always uploading footage to the cloud. We do this so that users can view historical footage even when the vehicle is off and cameras are offline. Buses do not spend much time idling in WiFi range, therefore a 4G connection is necessary to ensure the video feed can be successfully uploaded while the vehicle is en route.

Power considerations

In our deployments, the PoE switch and router are connected to ignition power

- The cameras are only on when the vehicle is turned on. This prevents the cameras from draining the battery when the vehicle is off.
- In order for users to view historical footage when the vehicle is off, cloud backup must be enabled for each camera, and there must be sufficient bandwidth delivered via the Cradlepoint for cloud backup to complete before the bus is turned off.

An alternative approach uses an uninterruptible power supply (UPS)

- The UPS provides power to the cameras for some period of time after the vehicle is turned off. This has not been tested in any of our deployments.
- If there is an accessible WiFi network where the vehicles park, the cameras could upload footage over this network during this period. In this case, a 4G connection would not be necessary to view historical footage, but would still be required to view live feeds while the bus is outside WiFi range.
- A UPS could also be used to keep the cameras powered full-time, which would allows users to access historical footage and run all camera features (People Analytics, motion search, etc.) when buses are parked and turned off.

Recommended camera models

- For transit deployments, we recommend Verkada's CM41-E. This mini dome camera offers a low profile, as well as suited for a wide range of weather and transit conditions.
- Certifications include: IP67, IP6K9K, IK10 vandal resistance, IEC 60950, IEC 62368, NDAA, EN 50155 Railway compliance, EN 45545 Railway Fire compliance, EN 50121 Railway EMC compliance.

How many cameras?

- The PoE switch and the strength of the cellular connection constrain how many cameras can be deployed. We have successfully tested up to 4 cameras per vehicle on a single switch and Cradlepoint.
- A single Veracity mobile PoE switch can support a maximum of 8 cameras or 80 Watts.
- A typical Cradlepoint 4G connection can support 4-6 cameras continuously uploading to the cloud (SD).
- Multiple Cradlepoints and PoE switches can be installed on a vehicle to allow for additional cameras.

Resources

CM41-E Overview	verkada.com/blog/cm41-e-mini-series-outdoor-dome/
Cradlepoint IBR900	cradlepoint.com/products/cor-ibr900-series
Veracity CamSwitch Mobile	veracityglobal.com/products/networked-video-integration-devices/camswitch-mobile.aspx
SIM Card With OTR Mobile Unlimited LTE Data Plan	otrmobile.com/product/bring-my-device-package/