The Fast Evolution of Emerging Technology in Transit

Vince Chan, P.E.

Electrical Engineering Supervisor

Gillig LLC

GILLIG

Overview

1. Where **WE ARE** – State of technology in transit

2. Where **WE WERE** – Lessons learned from the past

3. Where **WE'RE GOING** – Preparing for what's coming

GILLIG

Where WE ARE

What are we seeing on our buses and transit systems today?

- Automatic Vehicle Location (AVL)
- Computer Aided Dispatch (CAD)
- Automatic Vehicle Monitoring (AVM)
- Automatic Passenger Counter (APC)
- Traffic Signal Preemption (TSP)
- Fare Collection Systems
- On-Board Passenger Wifi
- Turn Warning Systems
- IP-based Network Video Surveillance

- Passenger Information Systems
- Driver Behavior Monitoring
- Event Data Recorders
- Infotainment Systems
- Geo-fencing
- Electronic Driver Vehicle Inspection Reporting (eDVIR)
- Asset Management
- Telematics

GILLIG

Where WE ARE

## How is this technology being used?

- Network Status

- Vehicle Location

- Vehicle Monitoring

- Vehicle Maintenance

- Incident Reporting

- Text Messaging

- Efficiency Reporting

- Remote monitoring

- Diagnostics

- Asset Management

- Revenue Analysis

- Route Optimization

Etc.

GILLIG

Where WE ARE

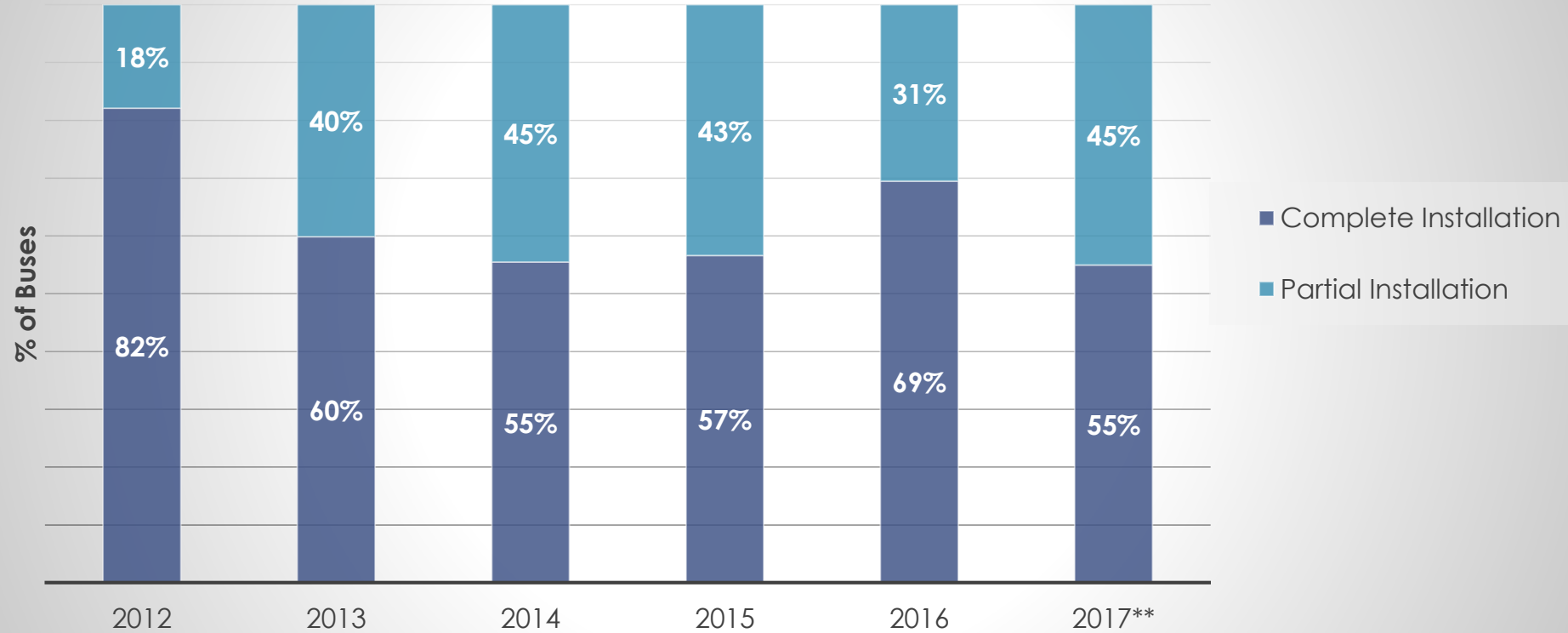Percentage of Produced Buses
with ITS Systems*

% of Buses

54%
83%
84%
86%
87%
90%

2012 2013 2014 2015 2016 2017**
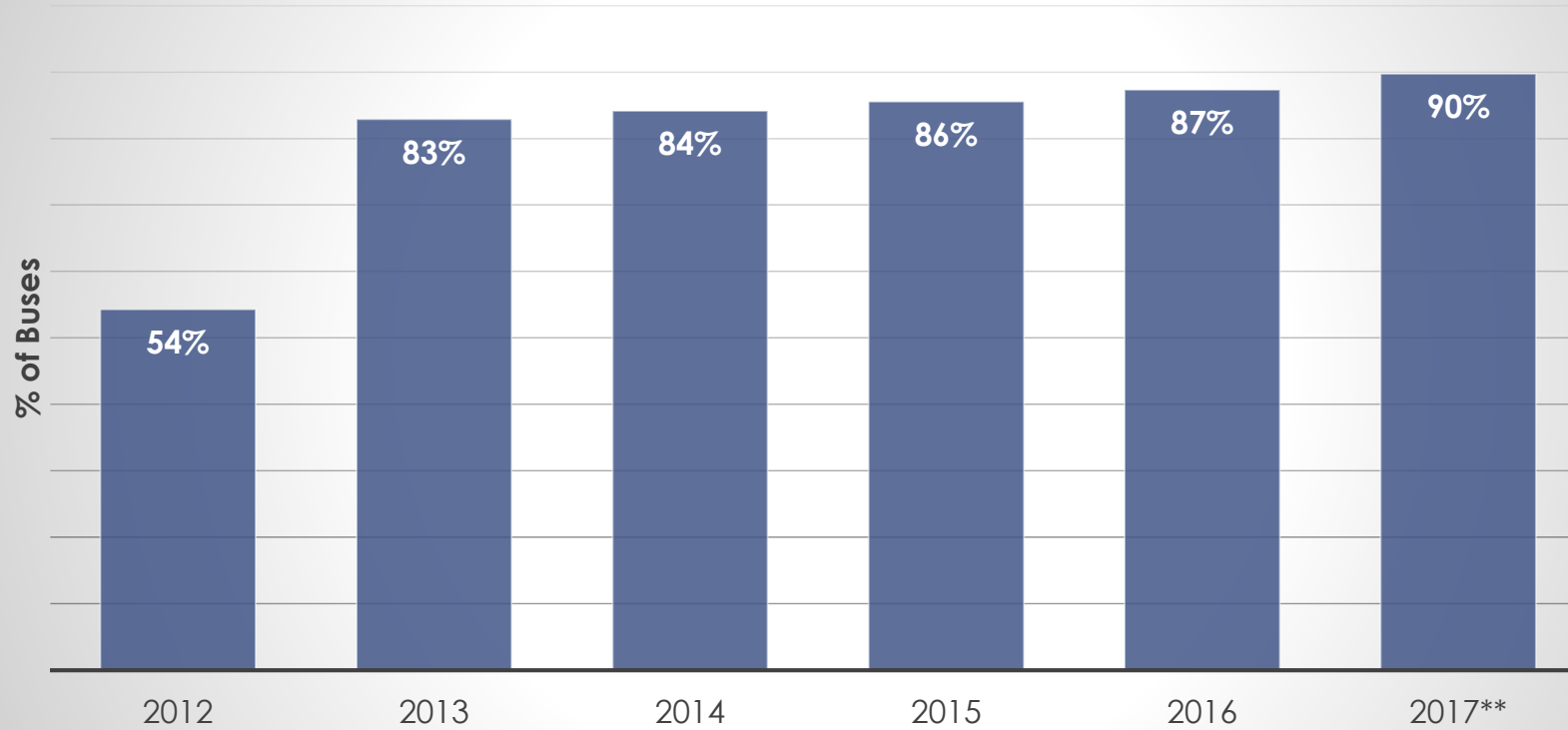
* = Major vendors that account for 90% or more of total annual production.
** = average of first three quarters only.

GILLIG

Where WE WERE

What can we learn from the past?

Issue	Result	Lesson
➢ Numerous design variations	➢ Variations in designs between customers. ➢ Increased probability of error.	STANDARDIZE
➢ Unorganized parts management	➢ Redundant variants for similar functions.	STANDARDIZE
➢ Obsolete protocols	➢ Outdated specifications that cannot accommodate advancements.	STANDARDIZE
➢ Delayed software development	➢ Lack of validation	STANDARDIZE

GILLIG

Where WE'RE GOING

We are at the tipping point of the next evolution in Emerging Technology in Transportation!

- Advanced Visioning Systems
- Pedestrian Warning Systems
- Collision Avoidance Systems
- Blind-Spot Detection Systems
- Accident Re-creation
- Remote Shutdown
- Automatic Emergency Braking (AEB)

- Automatic Emergency Steering (AES)
- Connected Services
- Asset Management
- Performance Analysis
- Vehicle-to-Vehicle (V2V)
- Vehicle-to-Pedestrian (V2P)
- Vehicle-to-Infrastructure (V2I)

- Vehicle-to-Anything (V2X)
- Intuitive Telematics
- Diagnostics
- Prognostics
- Advanced Driver Assistance Systems (ADAS)
- Autonomous Buses
- Shared Autonomous Vehicles

GILLIG

Where WE'RE GOING

"Stay on Top by Preparing Ahead"

➢ **Enable INTEROPERABILITY**

  ▪ Shared data between systems and devices over a common platform.

➢ **Ensure CYBER SECURITY**

  ▪ Added technologies to the network introduce additional vulnerabilities into the vehicle infrastructure. These vulnerabilities must be addressed.

➢ **Involve the OEM**

  ▪ Leverage the experience and expertise of the OEM to develop comprehensive solutions that enable consistent, reliable and quality designs across aftermarket and OE platforms.

GILLIG

WHEN IT COMES DOWN TO IT

Reliability in vehicle and in infrastructure is what we're all looking for.

- Emerging Technology is only relevant if it keeps our transit system operating reliably.

- How do we enable Emerging Technologies to be most reliable, most efficient and most effective?

EMERGING is only **RELEVANT** if it enhances **RELIABILITY**!

GILLIG

THANK YOU!