## **Columbus Division of Fire**

OPTICOM™ Signal Core EVP Pilot





## Agenda

- Introductions
- Project Overview
- Project Timeline
- Results Summary
- Results Presentation
  - Usage Statistics
  - Travel Time Study
  - Speed Study
  - Results Summary
- Improvement Suggestions
- Q&A

## Introductions

### **Columbus Division of Fire**

Lt. Willie Loper

Research & Development (Project Lead)

### **City of Columbus Traffic**

Mark Stephenoff

Division of Traffic Management

**Ryan Bollo** ITS/Technology Program Manager





## **GTT & PMI**

### <u>GTT</u>

Corey Yovich – Technical Project Manager Shannon Bailey – Strategic Account Director Allen Sharrer – Client Implementation Engineer

### <u>PMI</u>

Scott Morse – Systems & Business Development Manager
Kevin Allison – Territory Sales Manager
Dave Palmer – VP Engineering
Matt Adams – Field Service Engineer
Jacob Weber – Field Service Engineer

## What is OPTICOM<sup>™</sup>?

OPTICOM<sup>™</sup> is a traffic preemption solution that requests green lights in the direction an emergency vehicle is traveling and red lights for all other directions.

Improves first responder SAFETY Improves the SAFETY of the public Improves response time & efficiency SAVES LIVES!

# **Project Overview**

OPTICOM<sup>™</sup> Signal Core EVP Pilot

- 11x Intersections
- 5x Vehicles
- Two-phases, 60-day data collection period
  - 30 days of OPTICOM™ Disabled
  - 30 days of OPTICOM™ Enabled
- GTT managed project, supplied OPTICOM<sup>™</sup> hardware & Cloud Environment
- PMI installed & configured intersection
   equipment
- PARR installed & configured vehicle equipment



#### **Columbus Division of Fire - Opticom Signal Core Pilot**



## Solution Architecture

## **PROJECT OVERVIEW**

Durbit

#### • 11x Intersections

- East Dublin Granville Road & Forest Hills Boulevard
- East Dublin Granville Road & Cleveland Avenue
- East Dublin Granville Road & Spring Run Drive
- East Dublin Granville Road & Maple Canyon Avenue
- East Dublin Granville Road & Beechcroft Road
- East Dublin Granville Road & Tamarack Boulevard
- East Dublin Granville Road & Karl Road
- East Dublin Granville Road & Ambleside Drive
- East Dublin Granville Road & 71N
- East Dublin Granville Road & 71S
- East Dublin Granville Road & Busch Boulevard





## Intersection Hardware

### **OPTICOM™** Signal Core

- Built-in cellular modem (AT&T)
- Connects to traffic controller using NTCIP via Ethernet
- Provides preemption pathway for GTT
- Monitors Cabinet Conditions
- Live Telemetry views & SPaT Data





## **Vehicle Units**

BAT2 (Battalion Chief 2) E6 (Engine 6) M6 (Medic 6) M806 (Medic 806) EMS12 (EMS Supervisor 12)

## Vehicle Hardware

### Sierra Wireless MP-70 Modems (AT&T)

• Cellular/GPS antenna mounted to roof of vehicles

Connected to several vehicle outputs

- Park Signal/Air Brake (Disable)
- Light Bar Activation (Enable)
- Left/Right Turn Signal

Device always on for shoreline vehicles.

• For standard-chassis vehicles, device goes to sleep after 60 minutes, or low-battery detected



## **Project Timeline**



## Results Overview

### **IMPROVED SAFETY**

Emergency vehicles are safer going through intersections during green lights.

The public is safer with approaching emergency vehicles when they are stopped at a red light.

### **TRAVEL TIME SAVINGS**

Travel times are improved, and that improvement compounds the more OPTICOM<sup>™</sup> equipped intersections are used during the trip.

### **INCREASED SPEED**

With OPTICOM<sup>™</sup> enabled, emergency vehicles are more likely to safely travel through intersections without being impeded by traffic.

### Total Preemption Requests Per Vehicle



### Vehicle Preemption Requests Per Week



### **Total Preemption Requests Per Intersection**



Instersection Preemption Requests Per Week







#### Busch Blvd Preemptions By Approach Per Week



■A (WB) ■B (SB) ■C (EB) ■D (NB)

### 71S Preemptions By Approach Per Week



■A (WB) ■D (SB) ■B (EB) ■C (NB) N/A



#### 71N Preemptions By Approach Per Week



■ B (WB) ■ C (SB) N/A ■ A (EB) ■ D (NB)



#### Ambleside Dr Preemptions By Approach Per Week



■A (WB) ■B (SB) ■C (EB) ■D (NB)



#### 101 99 120 100 80 60 40 20 0 78 62 8 Week 1 Week 2 Week 3 Week 4 C (WB) 78 101 62 99 B (SB) 4 П 1 1 ■A (EB) 7 7 8 6 ■ D (NB) 14 14 8 8

■C (WB) ■B (SB) ■A (EB) ■D (NB)



### Tamarack Blvd Preemptions By Approach Per Week



■C (WB) ■D (SB) ■A (EB) ■B (NB)

#### Karl Rd Preemptions By Approach Per Week





### Beechcroft Rd Preemptions By Approach Per Week



■A (WB) ■B (SB) ■C (EB) ■D (NB)



Week1 Week 2 Week 3 Week 4 A (WB) D (SB) ■C (EB) B (NB) 

 $\blacksquare A (WB) \blacksquare D (SB) \blacksquare C (EB) \blacksquare B (NB)$ 





#### 60 50 40 30 20 10 Week 2 Week 3 Week 4 Week1 ■A (WB) B (SB) ■C (EB) ■ D (NB)

Spring Run Dr Preemptions By Approach Per Week

■A (WB) ■B (SB) ■C (EB) ■D (NB)

#### Cleveland Ave Preemptions By Approach Per Week



■A (WB) ■B (SB) ■C (EB) ■D (NB)



#### 60 50 30 20 Week1 Week 2 Week 3 Week 4 ■A (WB) B (SB) ■C (EB) D (NB)

Forest Hills Blvd Preemptions By Approach Per Week

■A (WB) ■B (SB) ■C (EB) ■D (NB)

### Travel time study

GTT used the data collected from both Phase #1 and Phase #2 as well as call data provided by CFD to create a call study that represents the average estimated saved time per call. Only 3 trips were identified that matched the below criteria and were included in the study:

- Repetitive destinations (10+ runs during Phase #1/Phase #2)
- Matching Time of Day
- Trips were started from Station #6
- Traveled through 4 or more OPTICOM<sup>™</sup> equipped intersections to reach the destination
- Using the same unit type (M6, M806)
- Could assume remainder of route after OPTICOM<sup>™</sup> equipped intersections
- Time of Day Groupings:
  - Morning Peak 0600-1100
  - Afternoon 1100-1600
  - Afternoon Peak 1600-2000
  - Night 2000-0600

## Trip #1 Travel Time Study

### CFD Station #6 to 1001 Schrock Rd WB

12 validated runs

- 9 runs Phase #1
- 3 runs Phase #2

#### Average Travel Time (Phase #1)

Night – 7:06 Morning Peak – 7:38 Afternoon – 6:32 Afternoon Peak – 7:38

#### Average Travel Time (Phase #2)

Night– 6:24 Morning Peak – Not enough data Afternoon – 6:12 Afternoon Peak – 6:09 Average Estimated Time Savings Night – 42 seconds (-11%) Afternoon – 20 seconds (-6%) Afternoon Peak – 89 seconds (-24%)



## Trip #2 Travel Time Study

### CFPD Station #6 to 5800 Forest Hills Blvd EB

- 12 validated runs
  - 5 runs Phase #1
  - 5 runs Phase #2

### Average Travel Time (Phase #1)

Night – 5:57 Morning Peak – Not enough data Afternoon – 4:55 Afternoon Peak – 5:41

#### Average Travel Time (Phase #2)

Night – 4:45 Morning Peak – 5:06 Afternoon – 4:59 Afternoon Peak– 5:06

### Average Estimated Time Savings Night – 72 seconds (-25%)

Afternoon – 37 seconds **(-12%)** Afternoon Peak – 35 seconds **(-11%)** 



## Trip #3 Travel Time Study

## CFPD Station #6 to 1111 Mediterranean Ave WB

- 12 validated runs
  - 7 runs Phase #1
  - 6 runs Phase #2

### Average Travel Time (Phase #1)

Night – 6:51 Morning Peak – 5:40 Afternoon – Not enough data Afternoon Peak – 6:10

### Average Travel Time (Phase #2)

Night – 5:41 Morning Peak – 5:14 Afternoon – Not enough data Afternoon Peak – 5:37

#### Average Estimated Time Savings

Night – 71 seconds **(-21%)** Morning Peak – 26 seconds **(-8%)** Afternoon Peak – 33 seconds **(-10%)** 



## **Travel Time Study**

6% to 15% of travel time saving per intersection

	Segment	Travel time (sec) when Preemption Disabled	Travel time (sec) when Preemption Enabled	% of Travel Time Saving
WB	10 -> 11	18	17	6%
	9 -> 10	14	12	11%
	8 -> 9	20	18	10%
	7 -> 8	26	24	8%
	6 -> 7	25	23	8% 🎬
	5 -> 6	21	19	10% 🎬
	4 -> 5	24	24	-
EB	4 -> 3	23	23	-
	3 -> 2	25	23	8%
	2 -> 1	27	23	15%



## Speed Study

### Median Travel Speed (MPH)

OPTICOM Disabled	OPTICOM Enabled	Change
29	43	+48%

## Speed study

Travel speed Varies by Intersection

Intersection Name	Median Speed OPTICOM Disabled (mph)	Median Speed OPTICOM Enabled (mph)	% of Travel Speed
Busch Boulevard	17.5	18	3%
715	47.5	49.1	3%
71N	42.6	50.3	18%
Ambleside Drive	33.1	46.4	40%
Karl Road	21.4	30.5	<b>42%</b>
Tamarack Boulevard	38.1	50.3	<b>32%</b>
Beechcroft Road	46.4	46.6	0%
Maple Canyon Avenue	14.7	14.3	-2% 📲
Spring Run Drive	46.2	46.2	0%
Cleveland Avenue	20.2	39.2	94%
Forest Hills Boulevard	39.4	44.3	13%

# Speed study

### Westbound – Full Segment

- Each dot represents "breadcrumb" data collected during the trip
- Red indicates slower speeds
- Green indicates faster speeds



# **Speed Study**

Eastbound – Full Segment

- Each dot represents "breadcrumb" data collected during the trip
- Red indicates slower speeds
- Green indicates faster speeds





### How can the OPTICOM<sup>™</sup> Preemption system be improved?

- Add preemption button to Station #6
- Adjust OPTICOM<sup>™</sup> approach zones to enhance preemption recognition
- Observe possible "backed-up" intersections
- Intersection timing & fine tuning
  - Max signal times
  - Pedestrian timings
- Allow pedestrian signal truncation
- Add additional OPTICOM<sup>™</sup> equipped intersections to compound travel time improvements

## **Results Summary**

### **Improved Safety**

Emergency vehicles are **SAFER** going through intersections during green lights.

The public is **SAFER** with approaching emergency vehicles when they are stopped at a red light.

### **Travel Time Savings**

Travel times are improved, and that improvement compounds the more **Opticom™** equipped intersections are used during the trip.

### **Speed Improvements**

With **Opticom**<sup>™</sup> enabled intersections, emergency vehicles are more likely to travel through intersections without being impeded by traffic.

### GLOBAL TRAFFIC TECHNOLOGIES MAKERS OF OPTICOM<sup>TM</sup>