



# City Challenges

**Cities are facing rapid urbanization, economic constraints, and environmental sustainability.**

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**Rapid growth puts pressure on city infrastructure**, making it harder to maintain citizen quality of life.



There's a **greater need to manage carbon footprint** and improve sustainability.



**Boosting the livability index** is more crucial than ever to retain and attract trade, commerce, and talent

**The ability to improve city infrastructure management is crucial to defining and achieving social, environmental, and economic success.**

# Cities Needs to Find New Ways to Enable Citizen Interaction and Deliver Services



Traffic  
Management



Public Safety



City Lighting



Pollution/  
Environment



Waste  
Management



Parking  
Optimization

**Cities traditionally address these challenges in silos.  
This Fragmented Approach Is Inefficient.  
Citizens are uninspired. The challenges are not solved.**



# Current State of Urban Services Technology

## Multi Vendor System

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While enables competitive environment for vendors, creates fragmented operations

Each vendor brings their own device to cloud offering leading to lack of single, common operations capability

## No Standardization on Data Models and APIs for City Infrastructure Devices

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Parking solution can be based on sensors or video analytics. No common data model

Multiple Lighting vendors bring in different interfaces for Adaptive LED lighting management and operations

## Lack of Common Data Infrastructure and Information Sharing

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City Safety Operations does not have real time view of Outdoor Lighting

Parking Operations can benefit from real time traffic information and location services

## Fragmented Application Eco System

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Different Applications leveraging different data sources and models.



# Parking Challenges





# Lighting Challenges





# Traffic & security Challenges





# Economic Results for Cities





# City Operating Model

System Management, Apps and Dashboards

Data Centre / Cloud Layer

City Layer

Street Layer





# Solution Components



**3** 3<sup>rd</sup> Party  
Sensors



**2** Cisco Data Plan



**4** 3<sup>rd</sup> Party  
Apps and Services

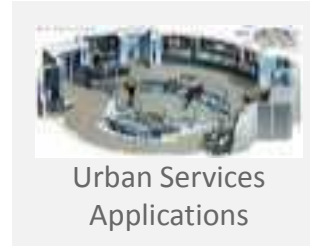


**1** Cisco Infrastructure/Core Networking



# The Platform Enables Multiple Smart City Use Cases

Citizen Engagement App  
Parking Enforcement App



Operations Center  
City Dashboard

## Cisco Smart+Connected™ Digital Platform

### MS Azure cloud

Lighting Cloud

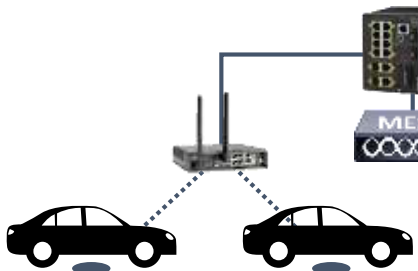
Parking Cloud

Cisco Digital Network Architecture for Cities

Traffic Cloud

Environmental Cloud

Cisco 819 with loX



Parking Sensors



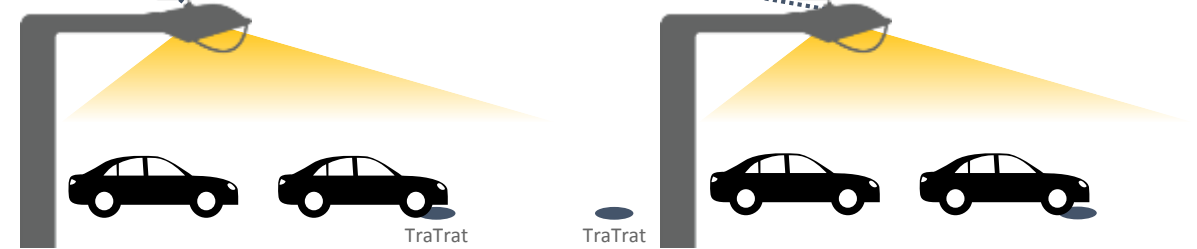
Cisco IR 910 with LoRa Module



Parking and Traffic Flow Sensors

Parking Sensor with Simtech LoRa

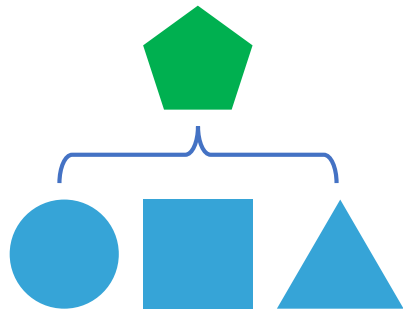
TraTrat



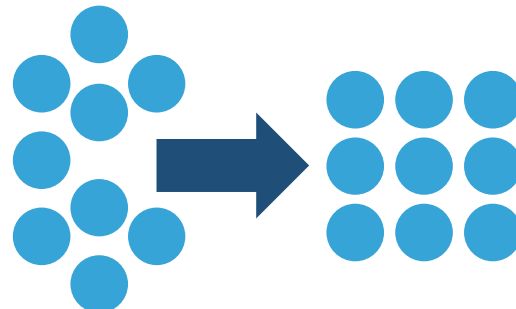
Parking and Traffic Flow Sensors

# Smart+Connected Digital Platform – What It Does

Aggregate Sensor Data from multiple sensors/sensor types regardless of backhaul through integration



Normalize the aggregated data to a common data model and build a Digital Model for the City



Expose APIs for local and global ISVs, Applications and City Systems to manage City infrastructure & services





# What should a city do?



1 - Find a visionary leader



2 - Move beyond planning



3 - Begin pilots that prove value



4 - Understand the costs and benefits



5 - Explore available funding options



6 - Improve internal support



7 - Explore technology options



8 - Start mobilizing technology



9 - Learn from peers



10 - Find the right partners





# *Connected Transportation*



# You Can with Cisco Validated Solutions



## Solutions

## Use Cases

## Customer Wins

### Cisco Connected Rail

(Connected Train, Station, Trackside)

- Positive Train Control (PTC)
- Passenger Wi-Fi
- Stations-as-a-Service (StaaS)
- Physical security onboard trains, in stations and trackside
- Improved wayfinding and passenger services



### Cisco Connected Roadways

- Real-time monitoring of road, weather, traffic conditions
- Proactive Maintenance Alerts
- Traffic Signal Prioritization (TSP)
- Live incident alerts and video
- Safer, less congested roads
- Centralized traffic management
- Better roadway utilization



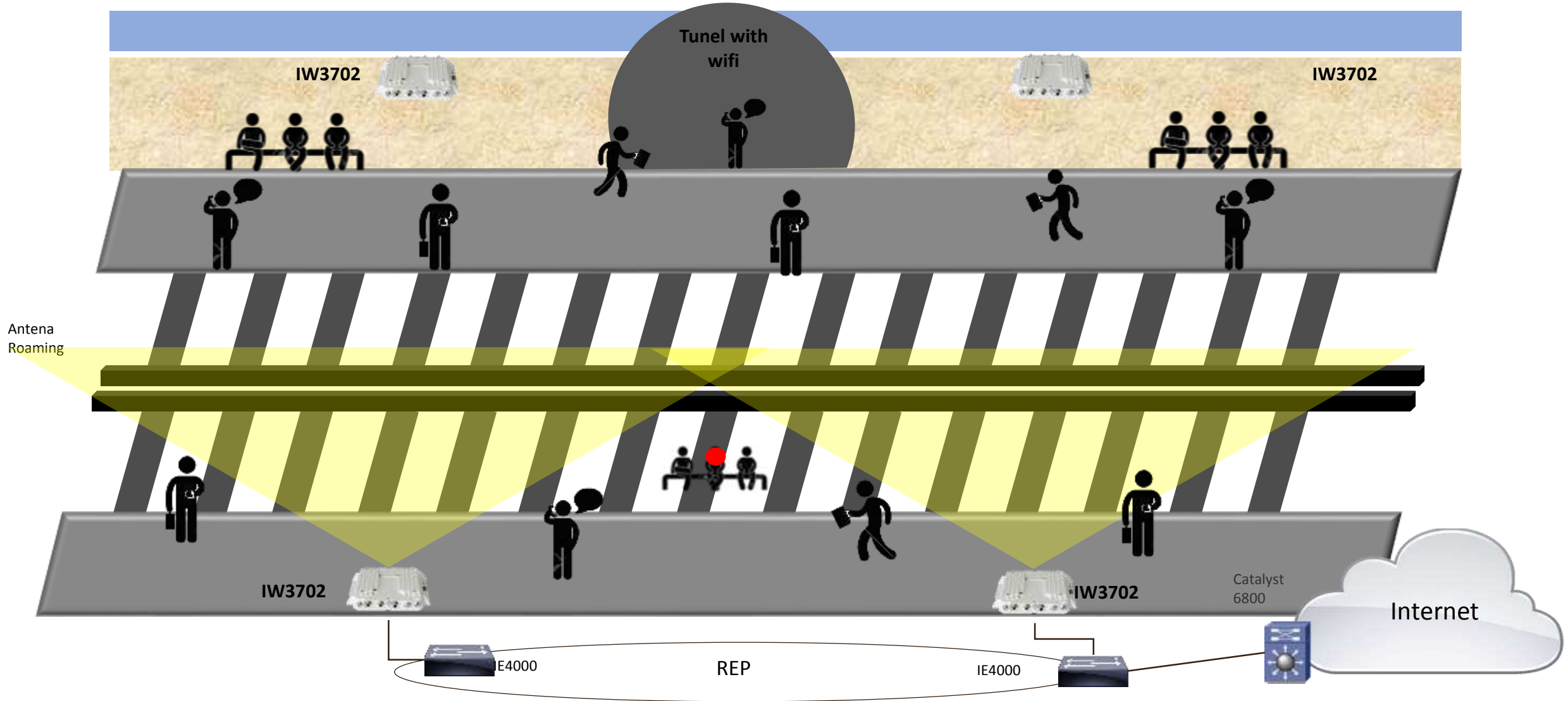
### Cisco Connected Mass Transit

- Onboard Passenger Wi-Fi
- Proactive Maintenance Alerts
- Connected Transit Vehicles
- Connected vehicles, yard, stops and stations
- Live video surveillance
- Better passenger experience



Cisco IoT System Provides the Underlying Network Infrastructure

# Subway Internet Access





# Moscow subway - Where we did that project

- Moscow subway was open at May 15th, 1935
- Nowadays it consists of 12 lines, 313,1km long (2 ways), 188 stations
- 44 stations are objects of cultural and historical heritage
- 6,73 million passengers is an average number which is transferred on a daily basis through subway. Max number is 9,3 million (registered at Nov 29<sup>th</sup>, 2012)
- Train speed is up to 80 Km/h



# Tunnel environment

- Harsh, dusty environment inside tunnel filled with electrically conducted dust made by running contacts (contact electric pair)
- Two times a year all tunnels are flushed with water for cleaning purposes
- Tunnels are different from materials and configuration point of view, even at the same line
- Antenna orientation toward moving train requires custom-made restrain system and hermetic boxes for RF equipment



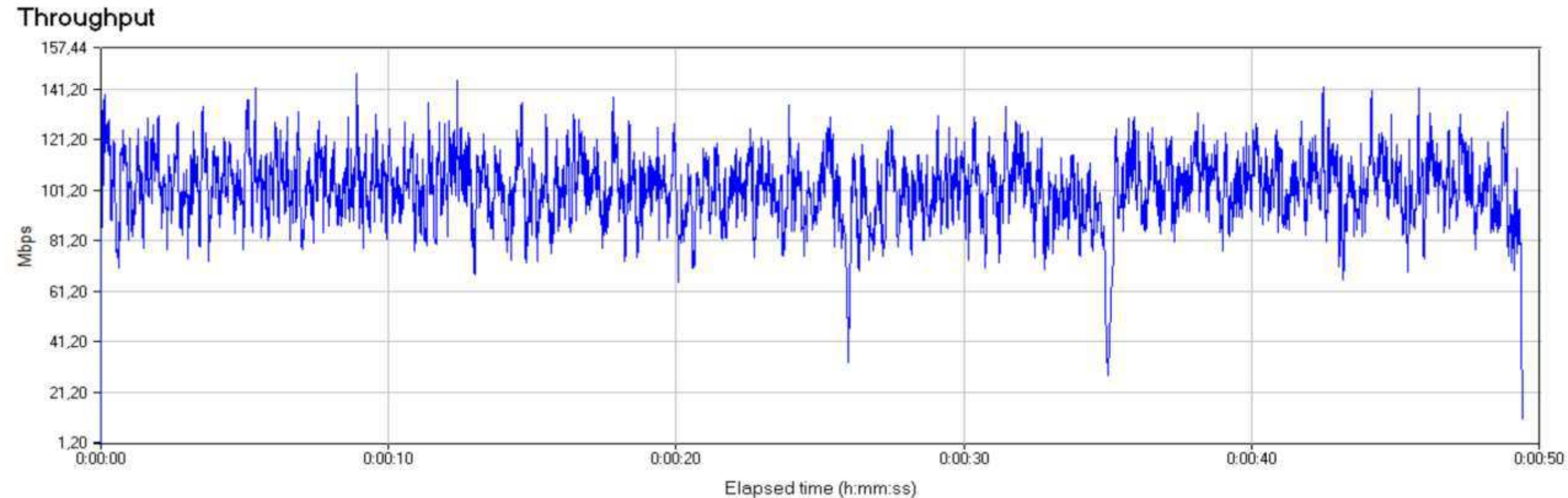


# Installation environment



# Performance results

- 100 Mbps an average TCP throughput (was 46, then 65 Mbps)
- AP distance range is extended up to 360 m (was 260 m at most)
- No L3 roaming impact on the throughput





# London Tube

<http://www.gizmodo.co.uk/2017/02/heres-what-tfl-learned-from-tracking-your-phone-on-the-tube/>



## TRANSPORT

Route identified for 75% of Liverpool Street to Victoria devices



Here's What TfL Learned From Tracking Your Phone On the Tube

## POPULAR THIS WEEK

SCIENCE



21 Mar 2017

How to Prove to Yourself That the Earth Is Round

FILM

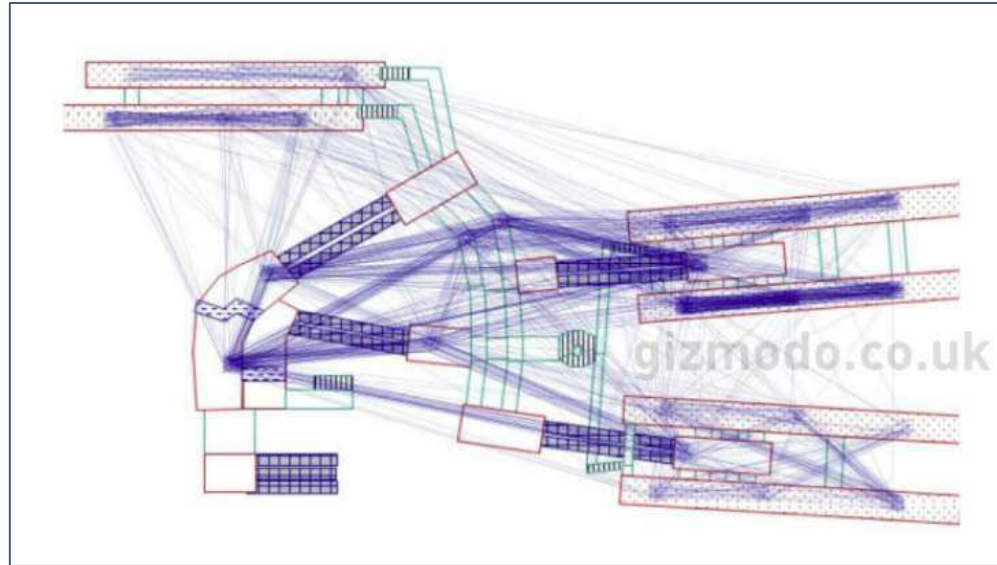


20 Mar 2017

The Power Rangers Film Doesn't Actually Want to Be a Power Rangers Film

# London Tube

- 54 out of 270 stations
- Route Tracking
- In-Station Tracking
- Advertising Potential



Transport for London

## WiFi data collection

We are collecting WiFi data at this station to test how it can be used to improve our services, provide better travel information and help prioritise investment.

**We will not identify individuals or monitor browsing activity.**

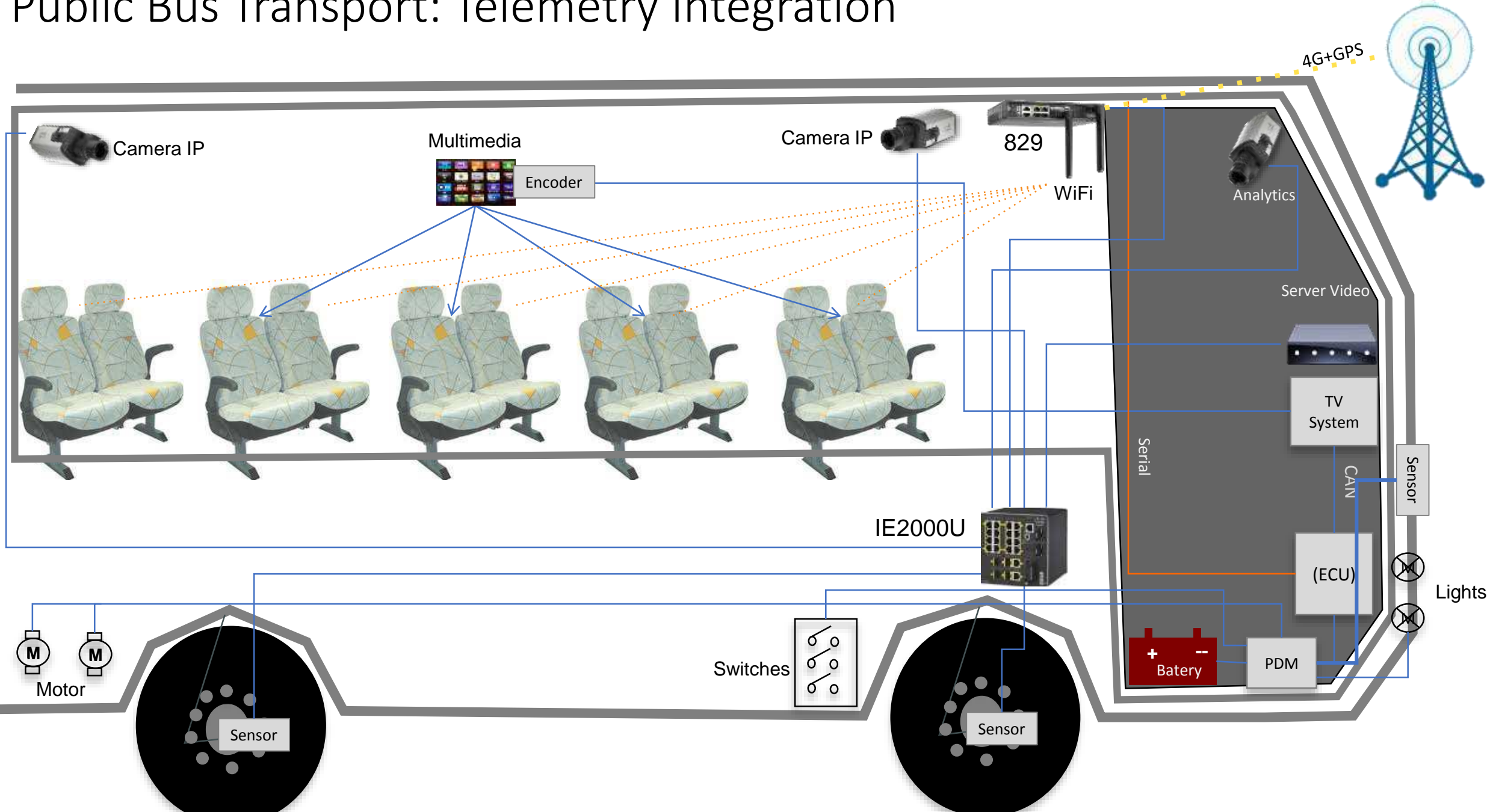
We will collect data between Monday 21 November and Monday 19 December.

For more information visit: [tft.gov.uk/privacy](http://tft.gov.uk/privacy)

MAYOR OF LONDON



# Public Bus Transport: Telemetry Integration



# Connected Bus Stations

4G+GPS



829H

IE2000U

Camera IP

Encoder

Camera IP

Publicidad

829H

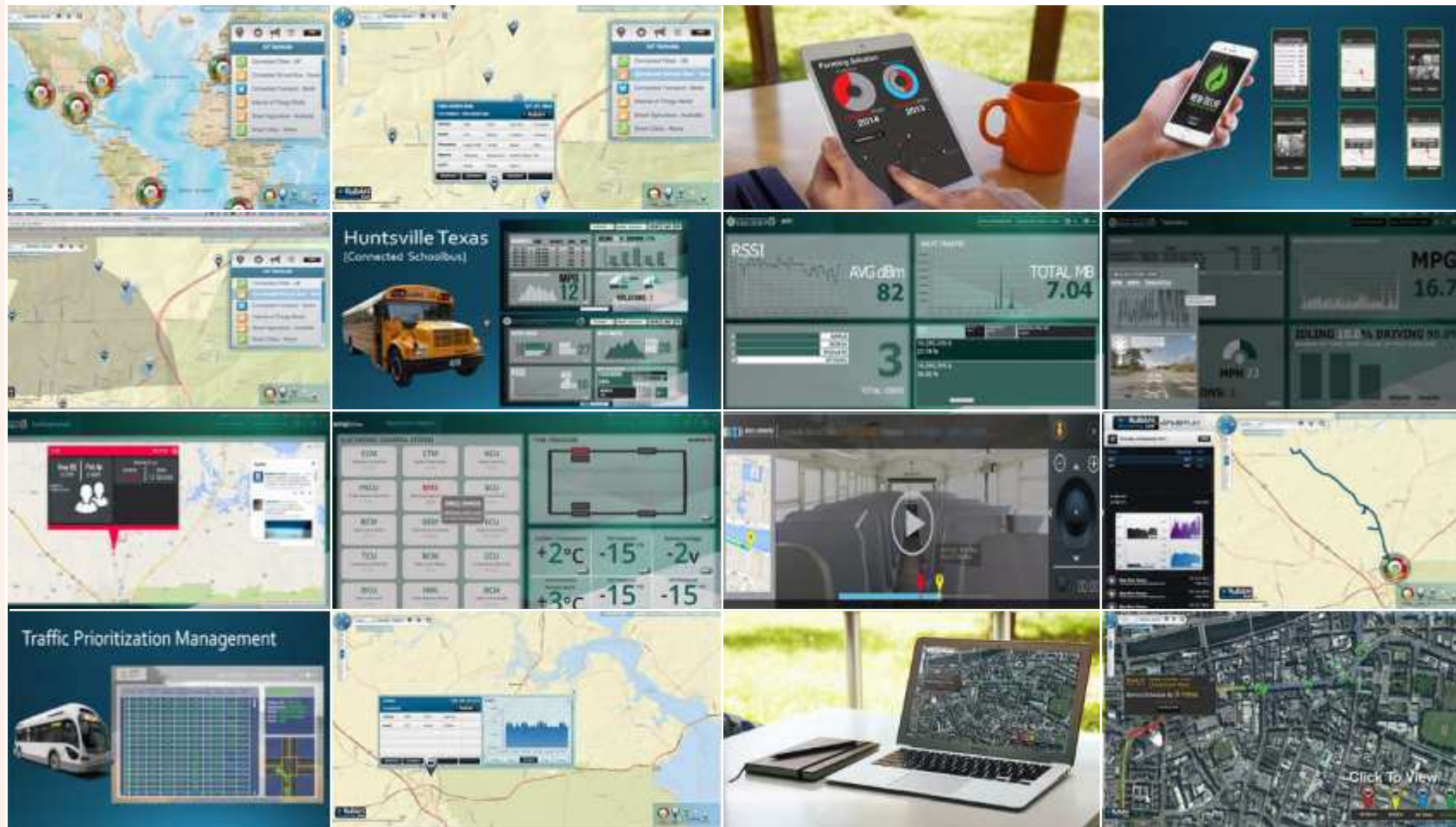




# *Transportation management*



# RuBAN: An IOT Service Delivery Platform





# RuBAN™ Vehicle to Vehicle



davra networks  
managing the internet of everything



BusStopAnalysis

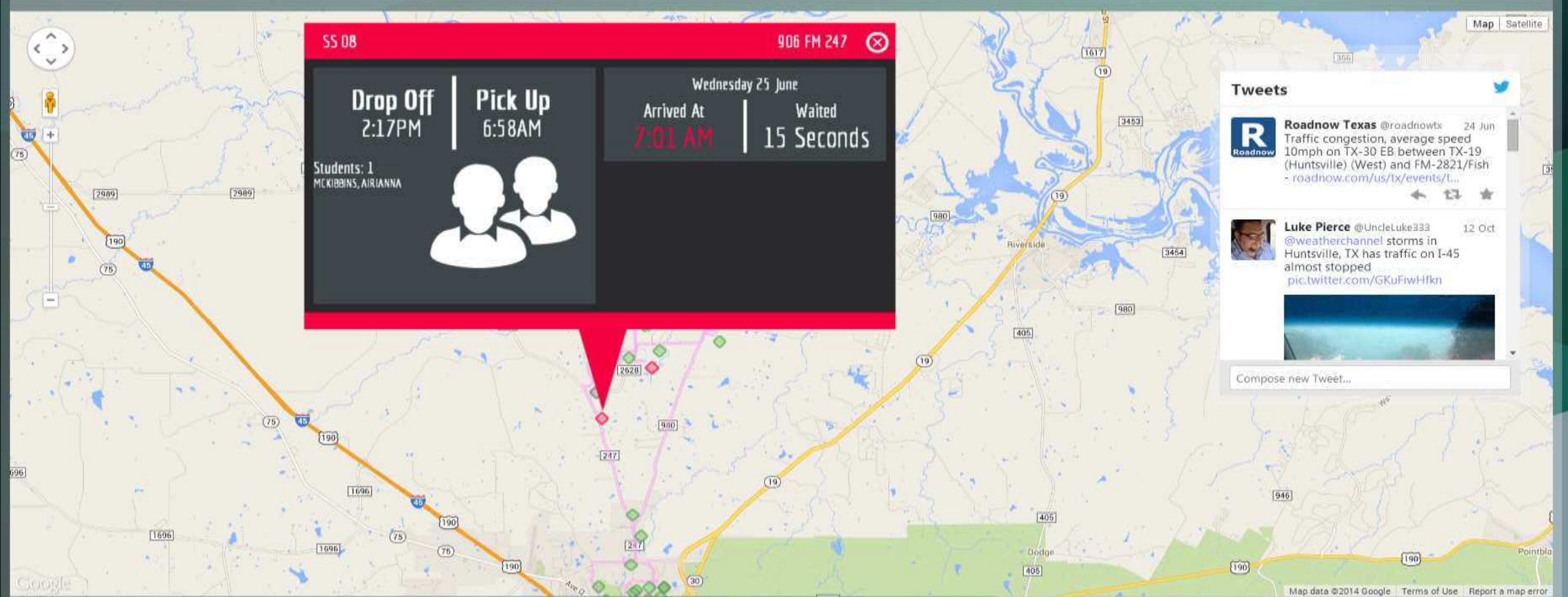
RuBAN IoT Portal | BusStopAnalysis | Reports | Admin | Help | Support | Logout

Device: HISD-DEMO-4358

June 25, 2014, 12:00 pm - 1:40 pm

Edit

Save



# RuBAN™ Driver Management



davra networks  
managing the internet of everything



HUNTSVILLE INDEPENDANT SCHOOL DISTRICT

Telematics

RuBAN ToE Portal | Telematics | Reports | Admin | Help | Support | Logout

Device: HISD-DEMO-4358

June 23, 2014, 12:03 pm - 1:44 pm

Edit

Save

### JOURNEYS

	TIME	SPEED	RPM	MPG
96-98 SMITH ... - EZBET QA...	25 JUN 7:22 - 8:18 PM	26	1479	14
101 MARTIN L... - EZBET Q...	25 JUN 12:06 - 1:40 PM	24	1455	18
		22	1375	17
		23	1433	16
		23	1412	17

### AVERAGE MPG FOR SELECTED JOURNEY

MPG  
16.7

JUNE 23, 2014, 12:03 PM - 1:44 PM

### RPM - MPH - THROTTLE

MPH 23

GEARS: 1

[MORE](#)

US-190, HUNTSVILLE, TEXAS  
ADDRESS IS APPROXIMATE

US-190

US-190

### IDLING 10.0% DRIVING 90.0%

NUMBER OF TIMES SPENT IDLING IN EACH DURATION

Duration	Number of Times
0-10 Seconds	12
10-30 Seconds	12
30-60 Seconds	9
60-120 Seconds	1
>120 Seconds	1

[MORE](#)



# RuBAN™ Vehicle Telematics



davra networks  
managing the internet of everything



springfield alsd Maintenance Report

RuBAN IoT Portal | Maintenance Report | Reports | Admin | Help | Support | Logout

Device: [Select Device] July 22, 2014, 12:32 pm - 1:32 pm [Edit] [Save]

### ELECTRONIC CONTROL SYSTEM

<b>SCM</b> Suspension Control Unit 0/100	<b>CTM</b> Central Timing Module 0/50	<b>ACU</b> Airbag Control Unit 0/50
<b>PSCU</b> Power Steering Control Unit 0/50	<b>BMS</b> Battery Management System 1/50	<b>SCU</b> Speed Control Unit 0/50
<b>BCM</b> Body Control Module 0/50	<b>GEM</b> General Electronic Module 0/4500	<b>ECU</b> Engine Control Unit 0/13500
<b>TCU</b> Transmission Control Unit 0/50	<b>BCM</b> Brake Control Module 0/50	<b>CCU</b> Convenience Control Unit 0/500
<b>DCU</b> Door Control Unit 0/100	<b>HMI</b> Human Machine Interface 0/2200	<b>BCM</b> Brake Control Module 0/100

**FAULT: GA4026**  
OVERHEAD LIGHT DEAD  
LOST CONNECTION TO MAIN BATTERY

### TYRE PRESSURE

**WARNING**

MORE


Coolant Temperature <b>+2°C</b> MORE	Oil Pressure PSI <b>-15</b> MORE	Battery Voltage <b>-2v</b> MORE
Transmission Temperature <b>+3°C</b> MORE	Oil Pressure PSI <b>-15</b> MORE	Oil Pressure PSI <b>-15</b> MORE

# RuBAN™ Physical Security





davra networks  
managing the internet of everything




 **davra networks**  
managing the internet of things

Huntsville School District : FTX175480XC : Timerange : July 1st 2014 1:30PM - 4:30PM



Minor Fault : Short Idling Time, 9.72 Seconds.





# Main User Interface



Powered  
By





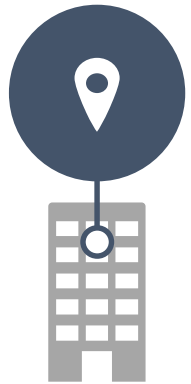


# *Transportation and crowd analysis*



# Cisco CMX - Gain Insights & Innovate

## DETECT



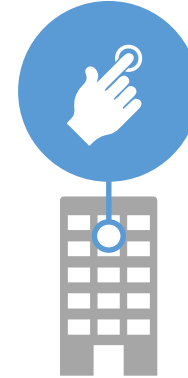
- Presence and location detection
- Visibility (Wi-Fi, BLE)

## CONNECT



- Easy Wi-Fi login, custom or social
- Zone-based, custom splash pages

## ENGAGE



- App-based mobile engagement
- Context-aware in-venue experiences



ANALYTICS

Presence



Location



Social

# Reference SIGNAL Festival

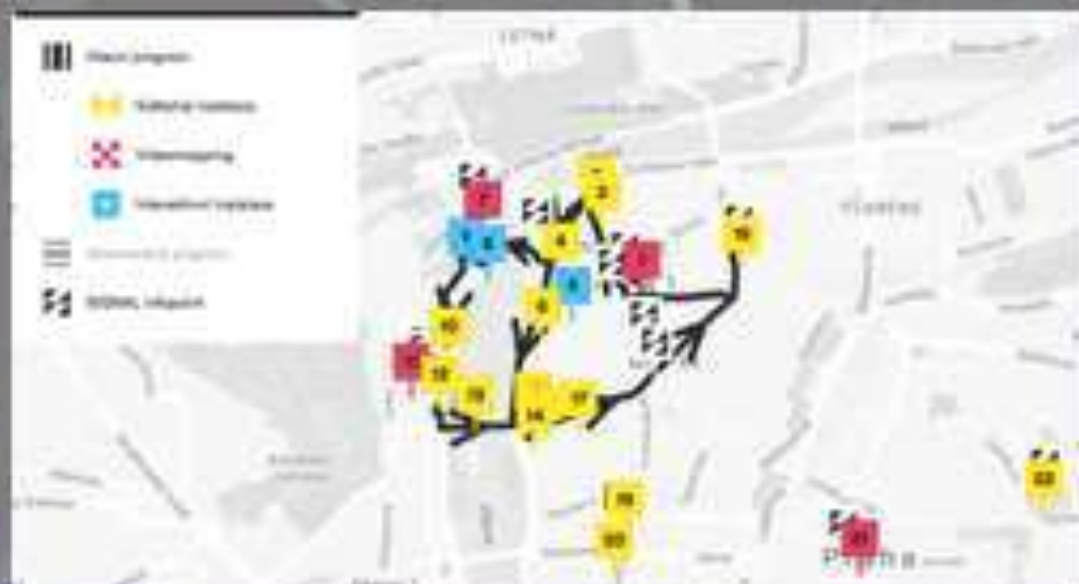
13. – 16.10.2016, Praha 1,2,3





# What is Signal Festival ?

- The SIGNAL festival is a light festival, the largest cultural event in the Czech Republic, bringing modern art and new technology
- WHEN : 13. – 16.10.2016
- HOW MANY : approx. 600 000 visitors
- WHERE : Prague City Center



ON  
AL

Free wifi hotspot

2 HYPERMARKET

## HOW DID WE DO IT ?

- 19 Cisco Outdoor Aps – 1532
- WLC 5520



- Cisco CMX presence
- Cisco CMX location
- Cisco CMX cloud



- SERVICES provided :
  - WIFI HOTSPOT
  - EMAIL HARVESTING
  - CMX – MEASURING/ANALYTICAL TOOL



# Visitors of the Festival, detected throughout whole day

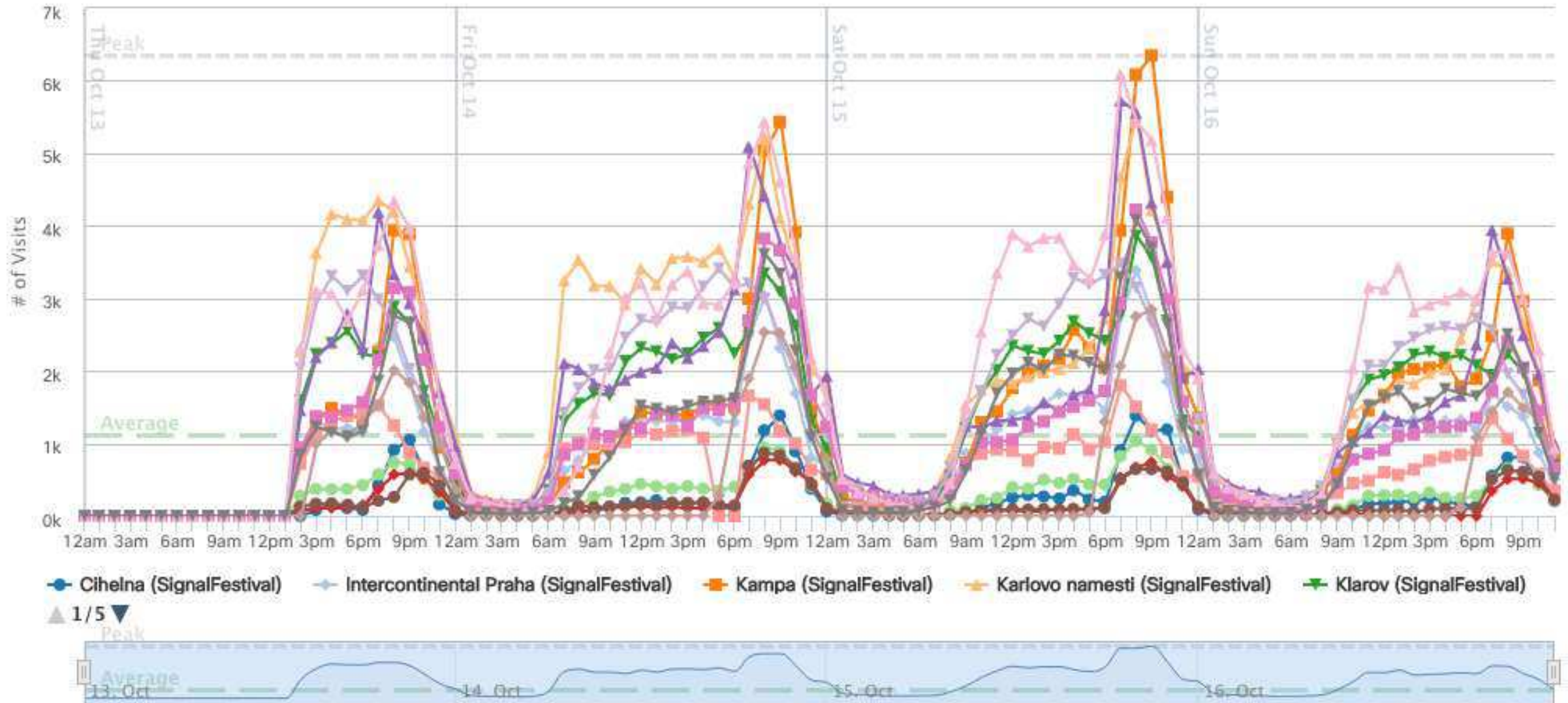


# Visitors of the Festival





# Individual installations throughout the day



# Time dedicated to individual installation

Dwell Time Breakdown | Oct 13 - 16, 2016



DAILY TREND



OR COMPARE DATA TO: PREVIOUS

Average Dwell Time | Oct 13 - 16, 2016



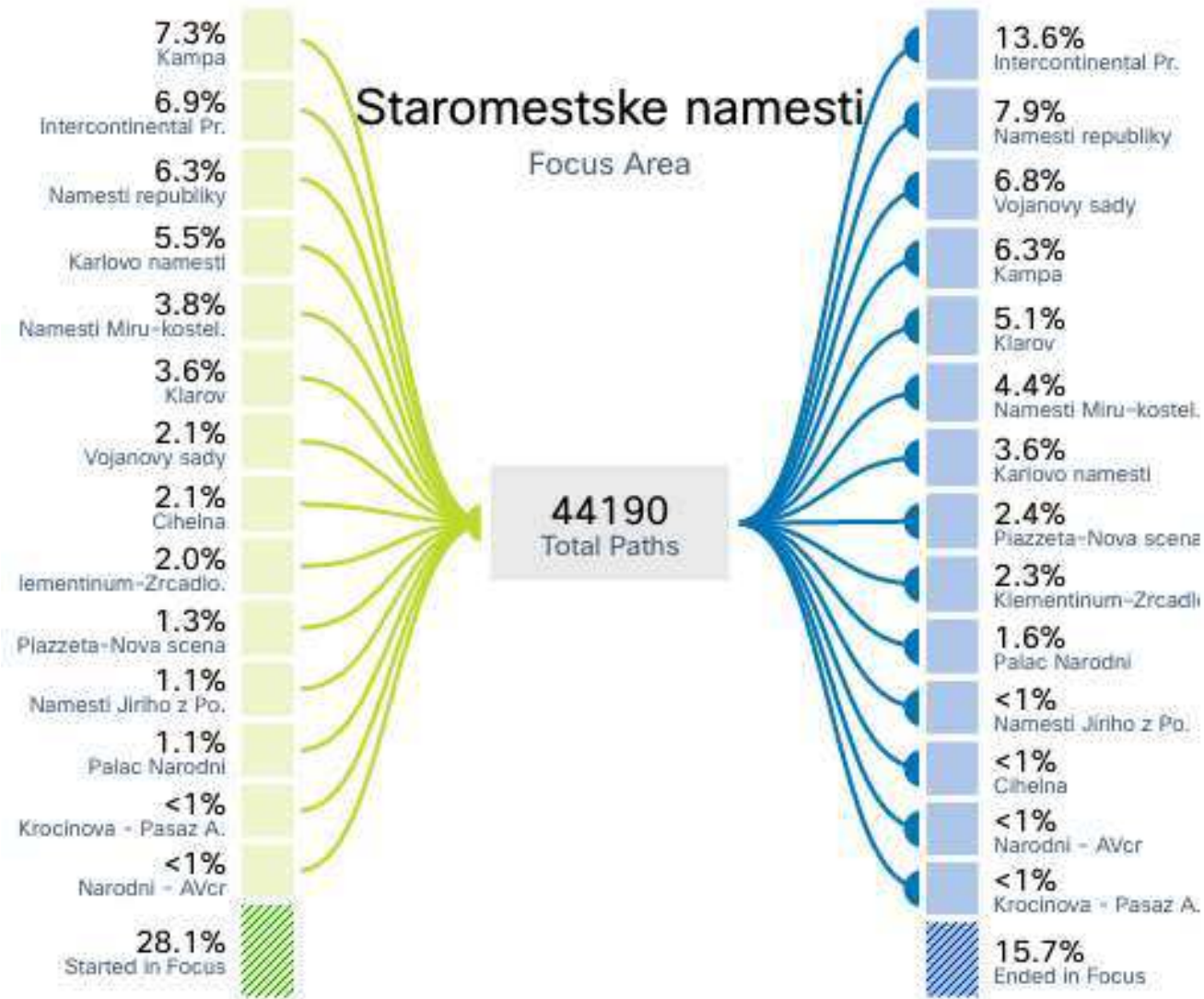
DAILY TREND



OR COMPARE DATA TO: PREVIOUS



# Paths analysis



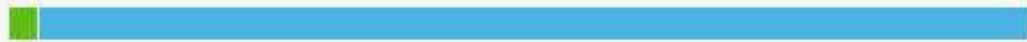
# Free – WI-FI as a public service

Wi-Fi Adoption | Oct 13 - 16, 2016



# 03%

Associated Percentage (?)



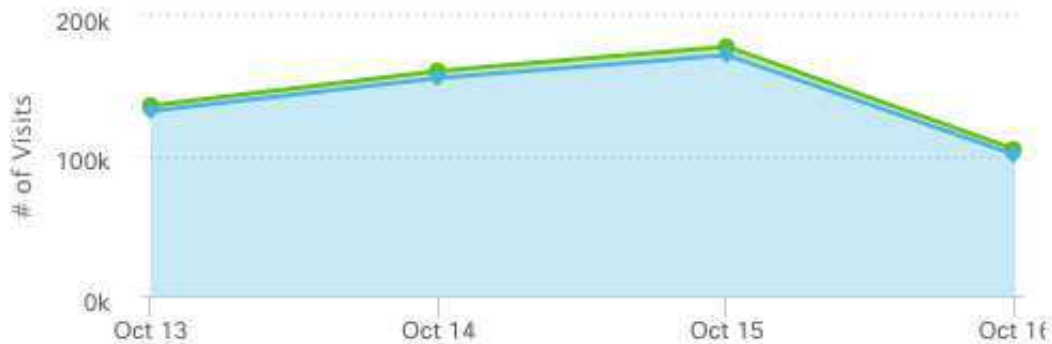
18,923

Associated - 03%

559,214

Probing - 97%

## DAILY TREND



OR COMPARE DATA TO: PREVIOUS



Enjoy free Wi-Fi on Signal Festival

Please kindly enter your email address. We will inform you about interesting news. By providing your email address you agree to process the data for crowd counting purposes.

Email\*



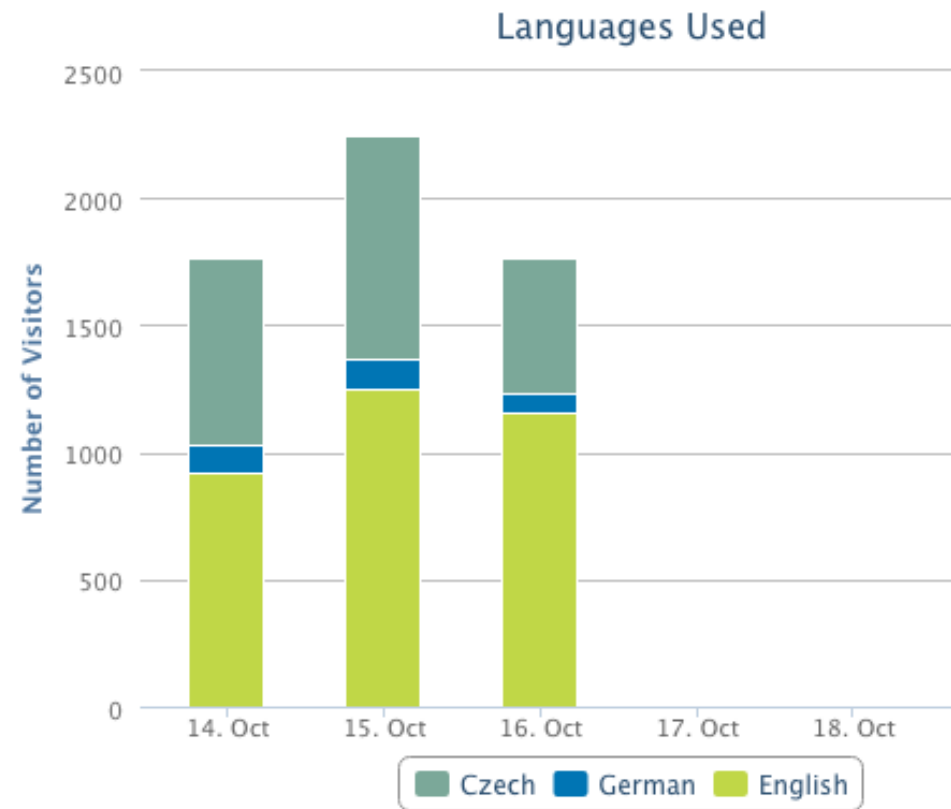
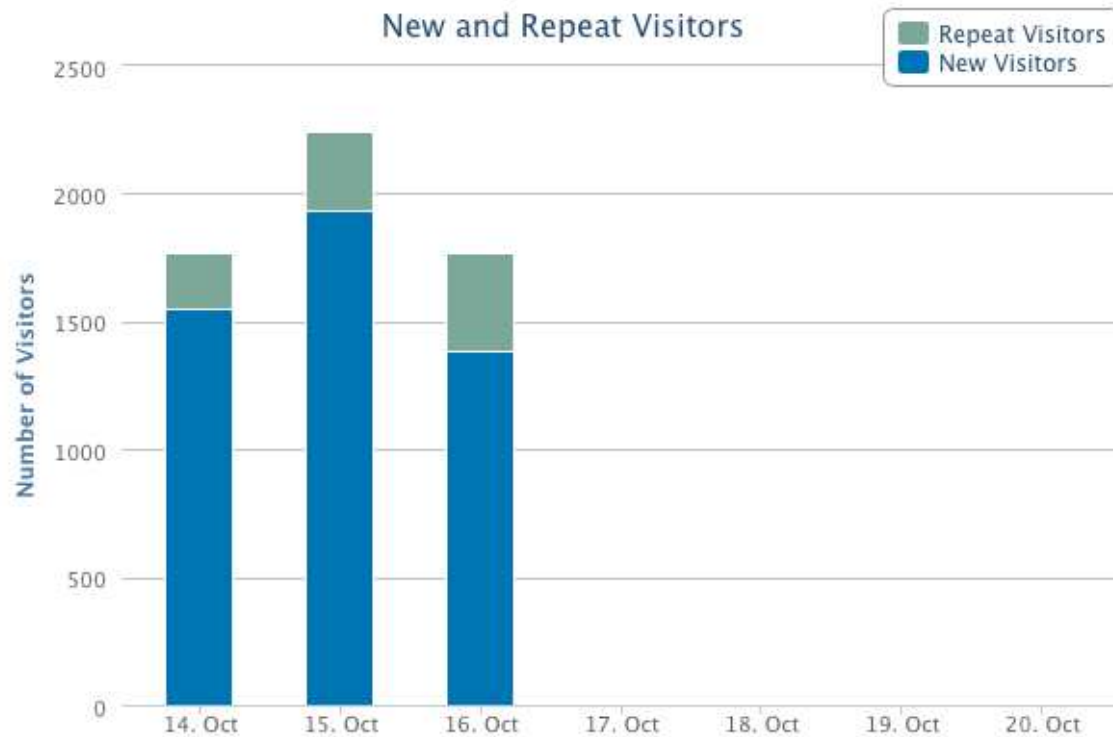
Connect

Sponsored by

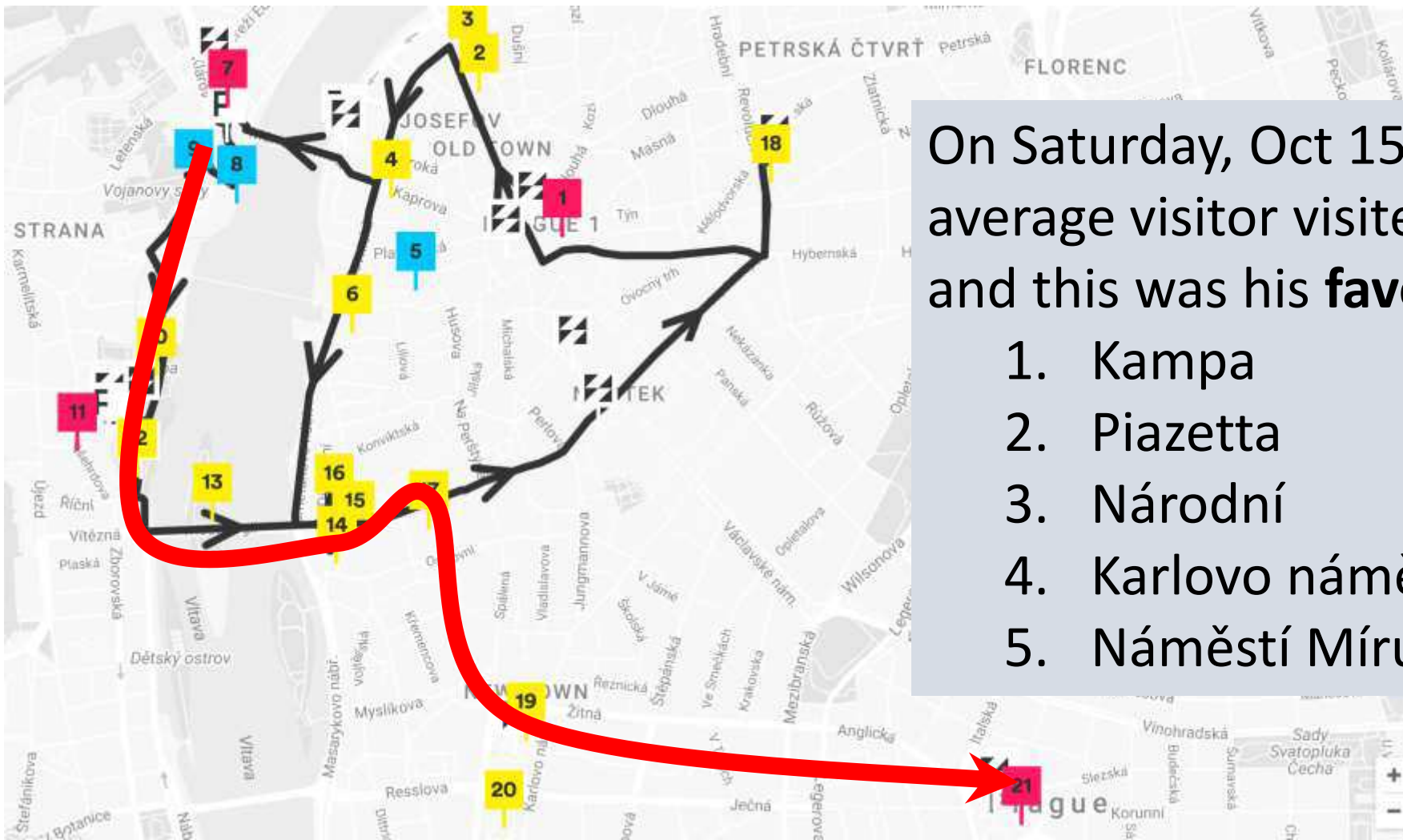




# Portál, preferovaný jazyk



# Typical Path – a bit extra data mining



On Saturday, Oct 15<sup>th</sup> 2016, the average visitor visited 5 installations and this was his **favorite path**:

1. Kampa
2. Piazzetta
3. Národní
4. Karlovo náměstí
5. Náměstí Míru



# BUSINESS OUTCOME

- **FESTIVAL OPTIMISATION**
  - LOWERING THE NUMBER OF INSTALLATIONS
  - ADJUSTMENT OF CATERING/SOUVENIR STALLS
  - MONETISATION
- **AUDIENCE**
  - PRECISE NUMBERS
  - ADJUSTMENT OF FESTIVAL ROUTE
- **SPONSOR IMPACT**
- **LOBBYING**
  - ECONOMIC IMPACT STUDY



Thank you.



