

# Smart and connected communities

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# What is a smart city

- A city where connected technology permeates daily operations, enabling
  - Large scale and frequent sensing of a number of indicator variables, e.g. traffic speed, energy usage across buildings
  - Big Data analytics is used for optimizing both city operations and residents interactions with the cities
  - Decision support systems are enabled and employed to allow the residents and city officials to take optimal decisions.




# Example 1: Smarter Public Transit Operations

## TRANSIT-HUB


A SMART DECISION SUPPORT SYSTEM FOR PUBLIC TRANSPORTATION

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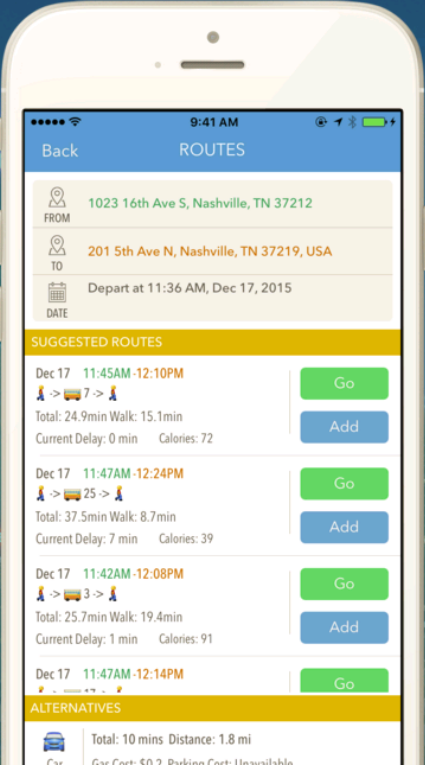
With the Transit-HUB app, Nashville residents, commuters and visitors can plan trips using public transit, compare trip options, watch real-time bus locations, receive smart trip notifications and get step-by-step navigation.



To know more about the application and the T-HUB Decision Support system, watch the video.



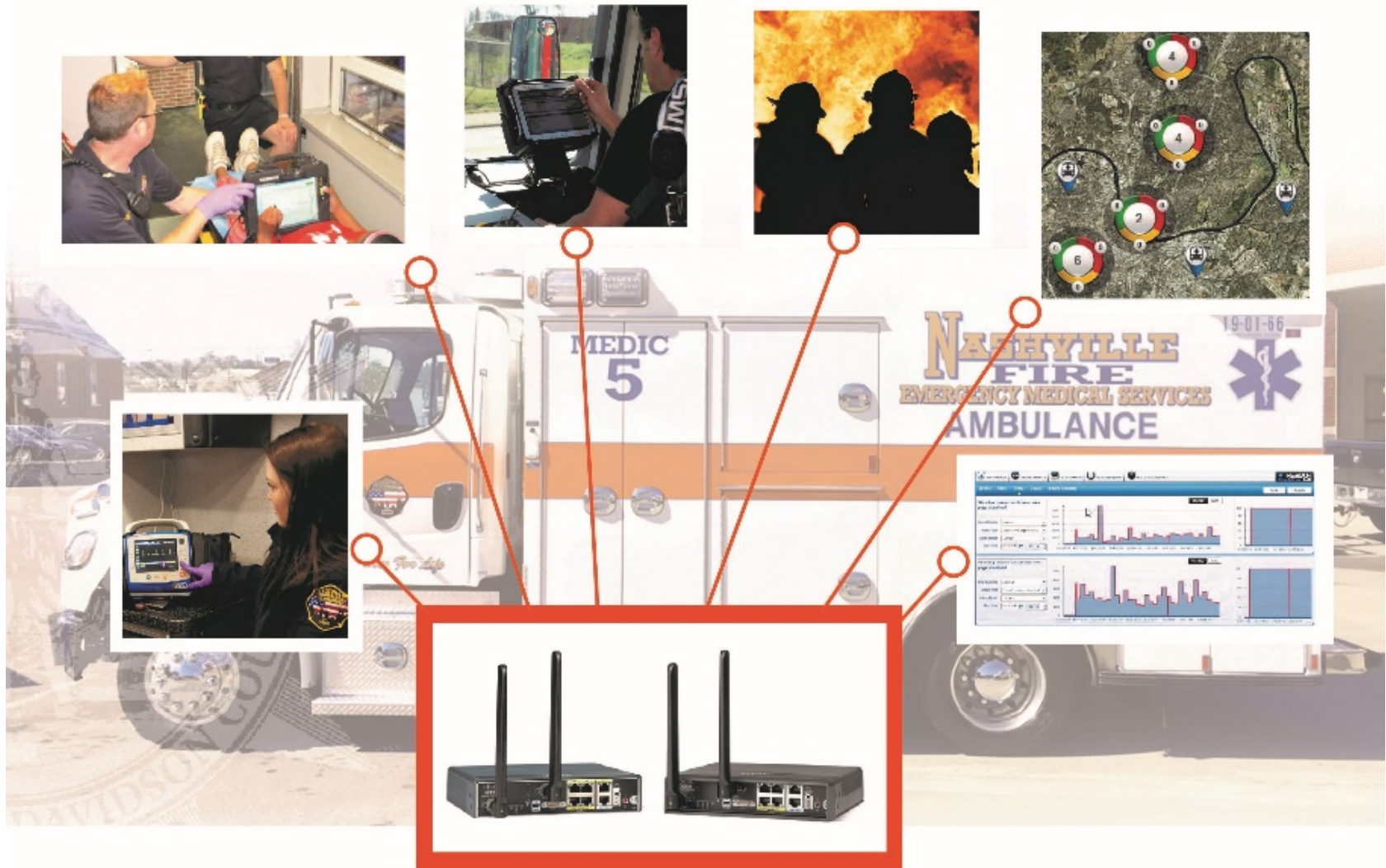
**Acknowledgement:** Research on Transit-Hub is sponsored under a research



The smartphone screen shows the Transit-HUB app interface. At the top, it says 'Back' and 'ROUTES'. Below that, it displays the origin and destination: 'FROM 1023 16th Ave S, Nashville, TN 37212' and 'TO 201 5th Ave N, Nashville, TN 37219, USA'. The departure date is 'Depart at 11:36 AM, Dec 17, 2015'. Under 'SUGGESTED ROUTES', there are four options, each with a 'Go' button and an 'Add' button. The first route is 'Dec 17 11:45AM -12:10PM' with a total time of 24.9min, 15.1min walk, 0 min delay, and 72 calories. The second route is 'Dec 17 11:47AM -12:24PM' with a total time of 37.5min, 8.7min walk, 7 min delay, and 39 calories. The third route is 'Dec 17 11:42AM -12:08PM' with a total time of 25.7min, 19.4min walk, 1 min delay, and 91 calories. The fourth route is 'Dec 17 11:47AM -12:14PM'. Below 'SUGGESTED ROUTES' is an 'ALTERNATIVES' section with a 'Total: 10 mins Distance: 1.8 mi'.



# Example 2: Smart Emergency Response System



Why now? What has changed?

# Machine Learning is changing the “old economy”



Apple



Google



Uber

“Apple’s Project Titan could reshape the auto world”

Prototypes are already on the road in California

Every 2 days a new city, each week a new country!

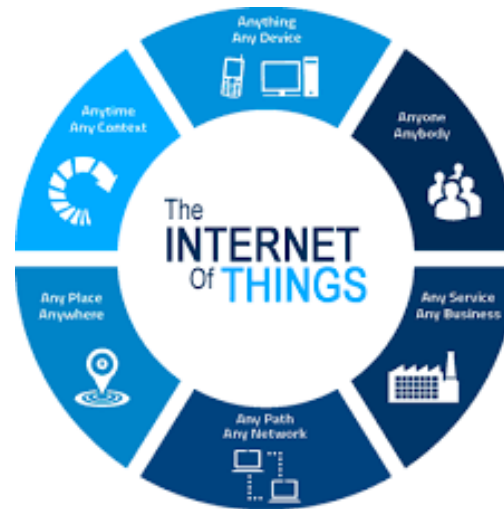
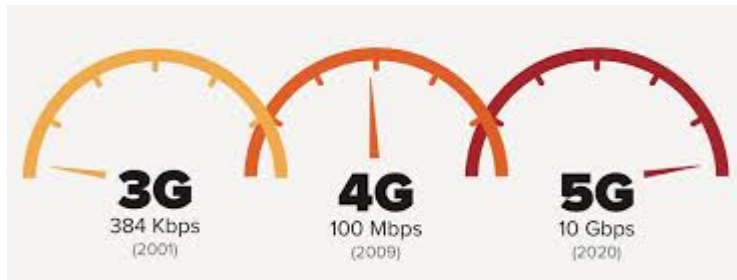


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# Network connectivity is enabling tighter integration



# Accessible Computing



All smart devices have ability to compute and collaborate.



# Social network is connecting residents



# What is smart city?

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- Smart city =
  - Social Network + Accessible Computing + Network connectivity + Machine Learning and Data Analytics

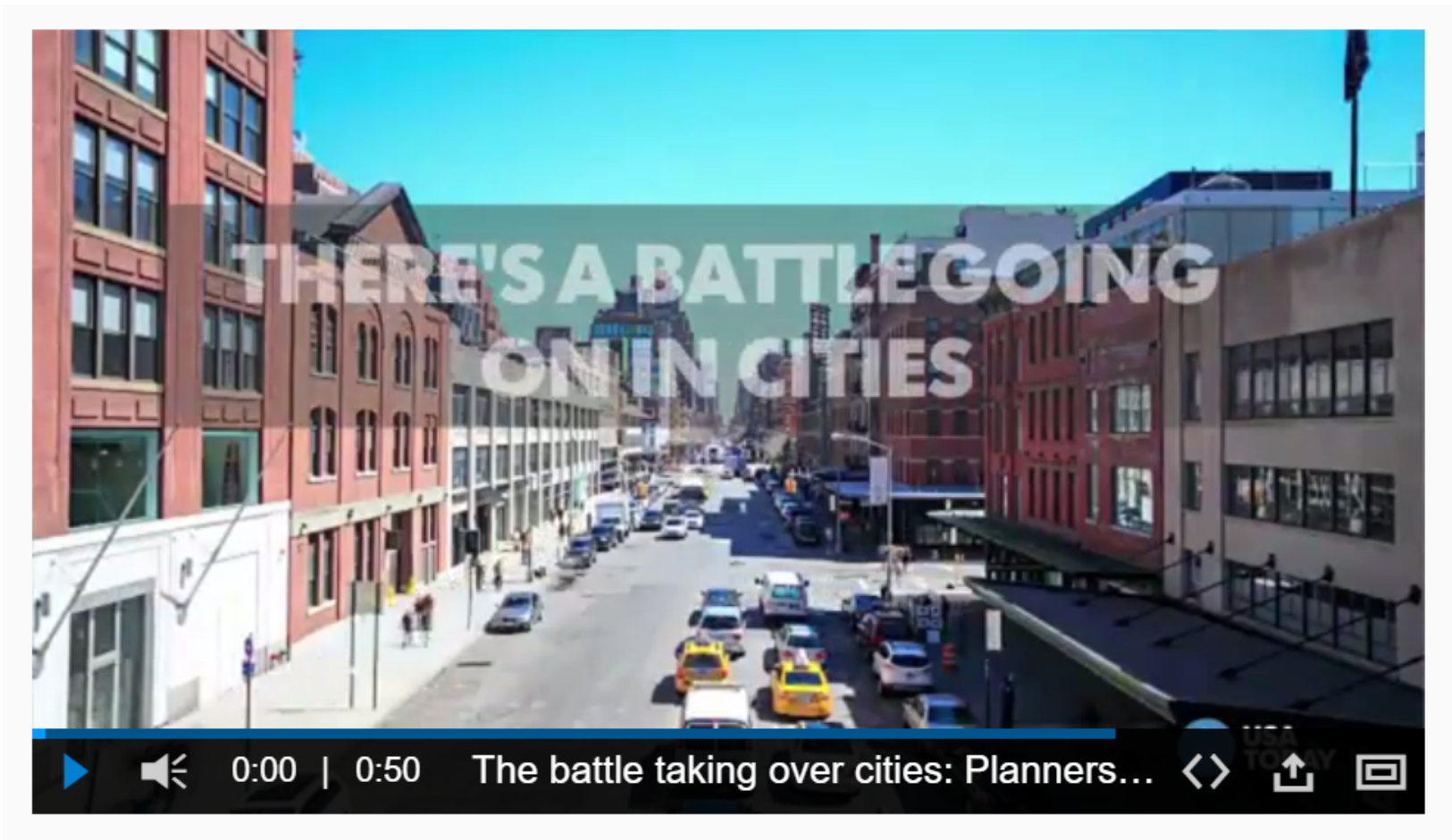


What are the challenges?

# Optimal distribution of Information

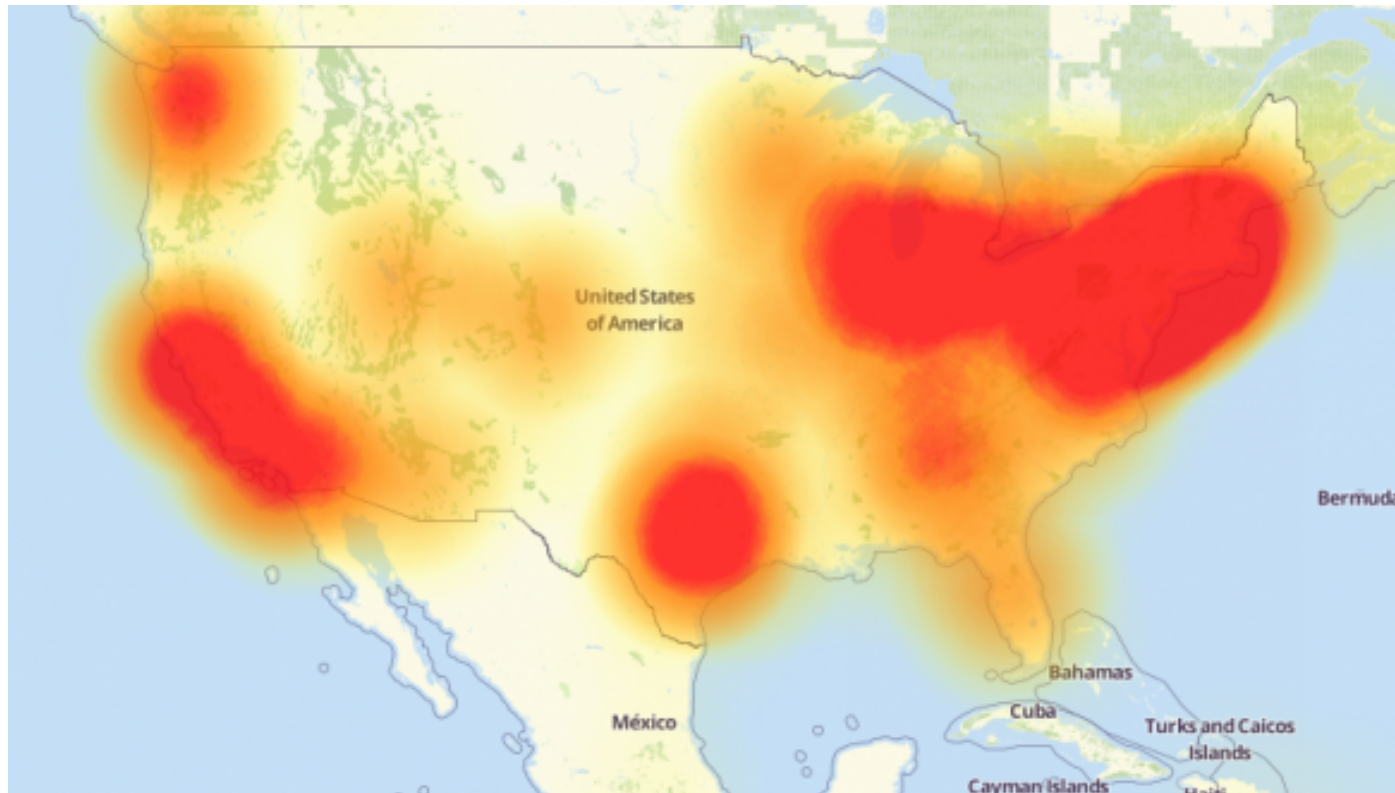
- The biggest challenge is to **connect the information** from sensors to the analytics, which then has to be **disseminated** to residents in real-time.
- This has to be done smartly otherwise even the 5G network will not be enough.
  - For example, the size of all raw video images in a large city can easily be **more than 1 TB** per second.

# Better Decision Support Algorithms



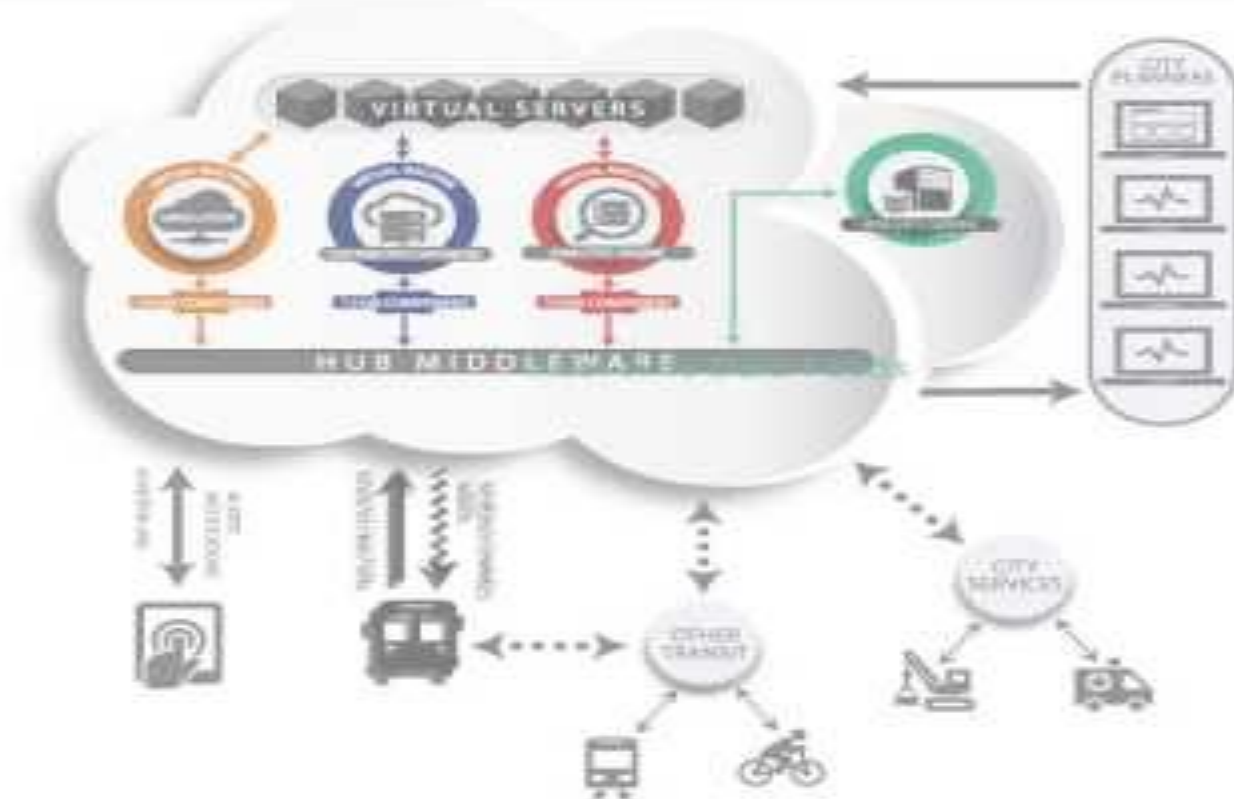


# Better Security of Devices



*A depiction of the outages caused by attacks on Dyn, an Internet infrastructure company. Source: Downtdetector.com.*

# Transit-hub



# Questions?