DB4IoT
Tracking Down ITS Data Errors
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Moonshadow

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Let’s start with a Simple Question:

How long does it take my bus to run this route?

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The answer is not so simple because of . . . traffic

Traffic is affected by:

Day Type

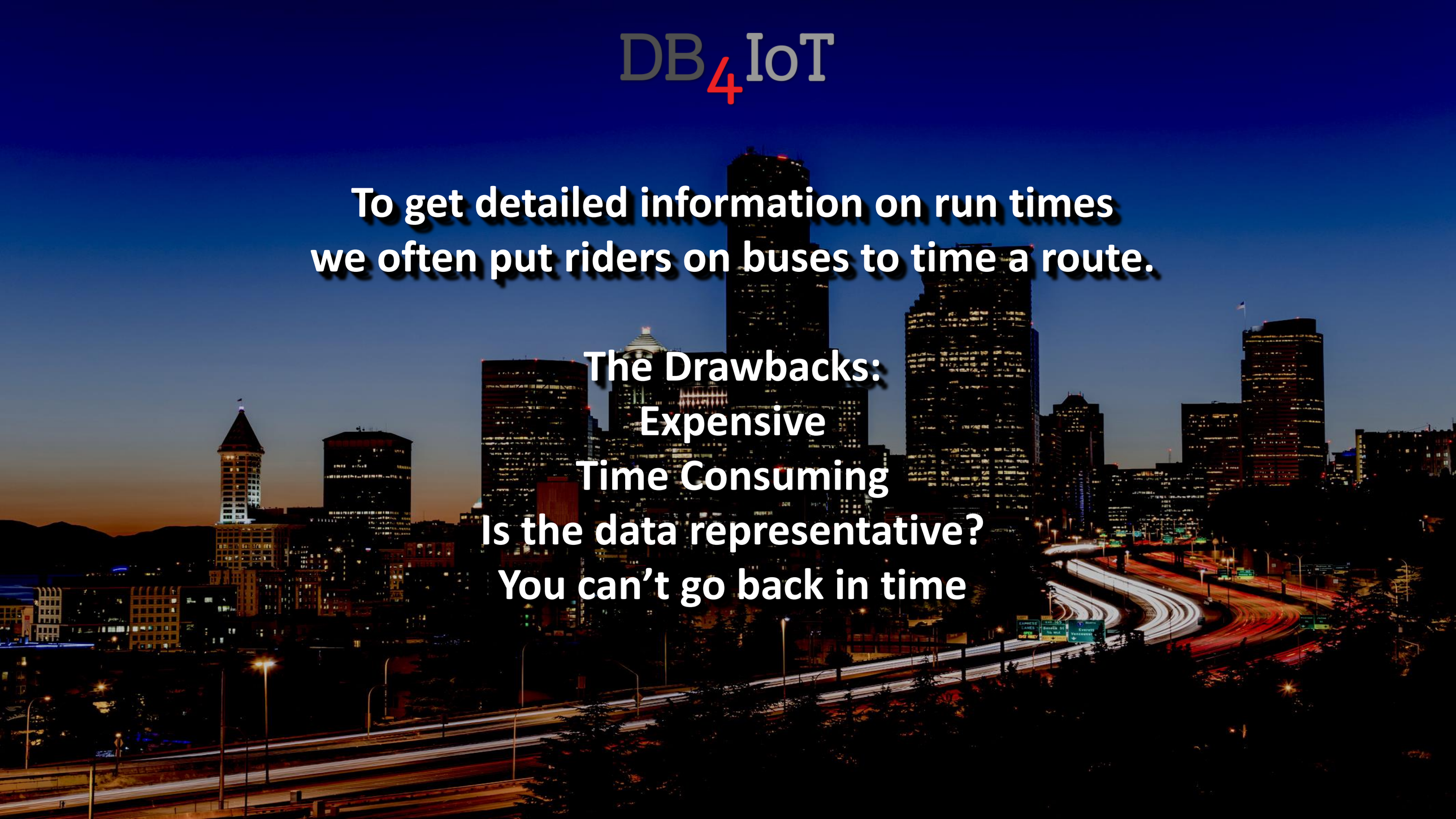
Time of Day

Construction

Accidents

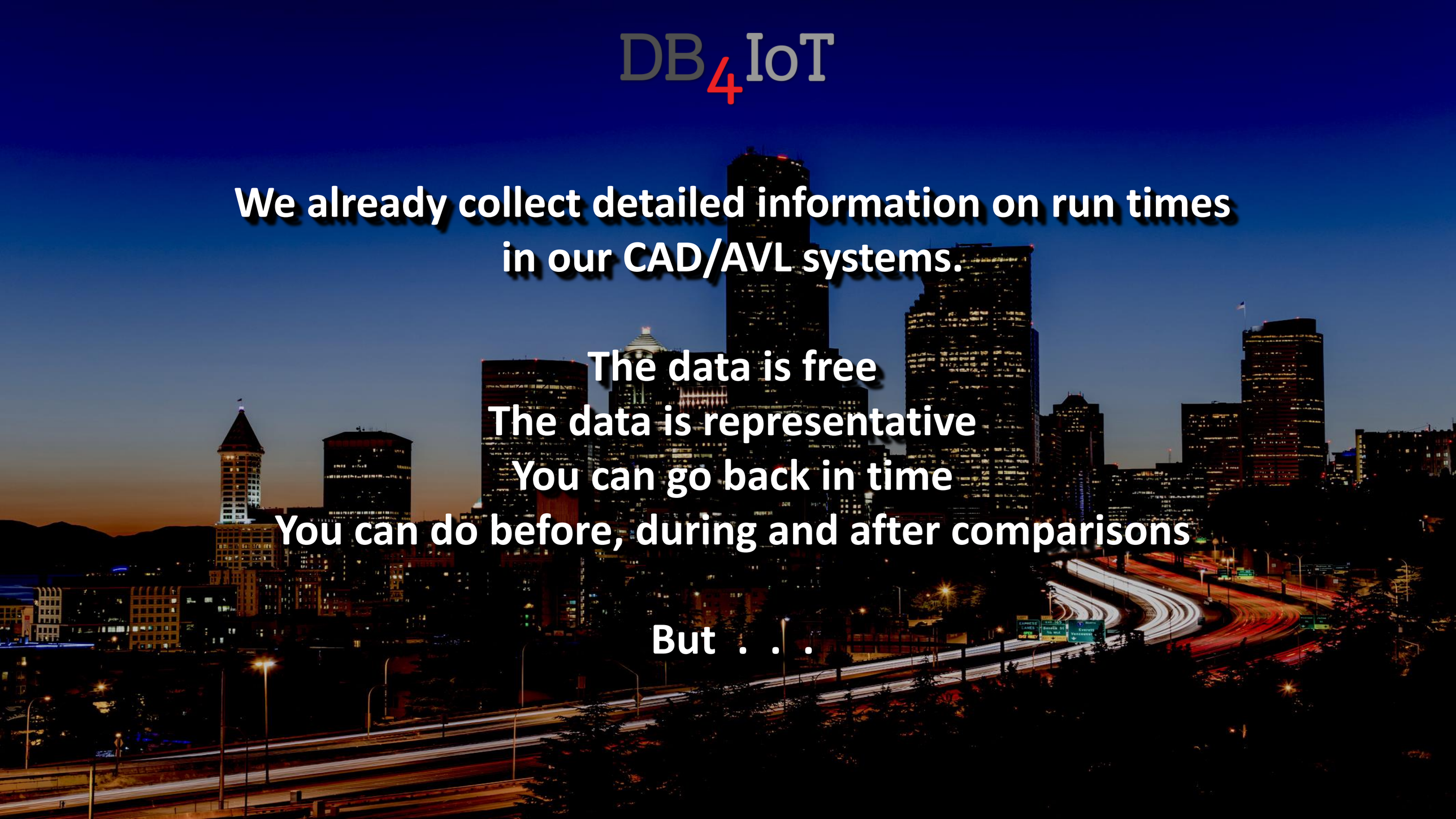
Holidays

Events



To get detailed information on run times
we often put riders on buses to time a route.

The Drawbacks:
Expensive
Time Consuming
Is the data representative?
You can’t go back in time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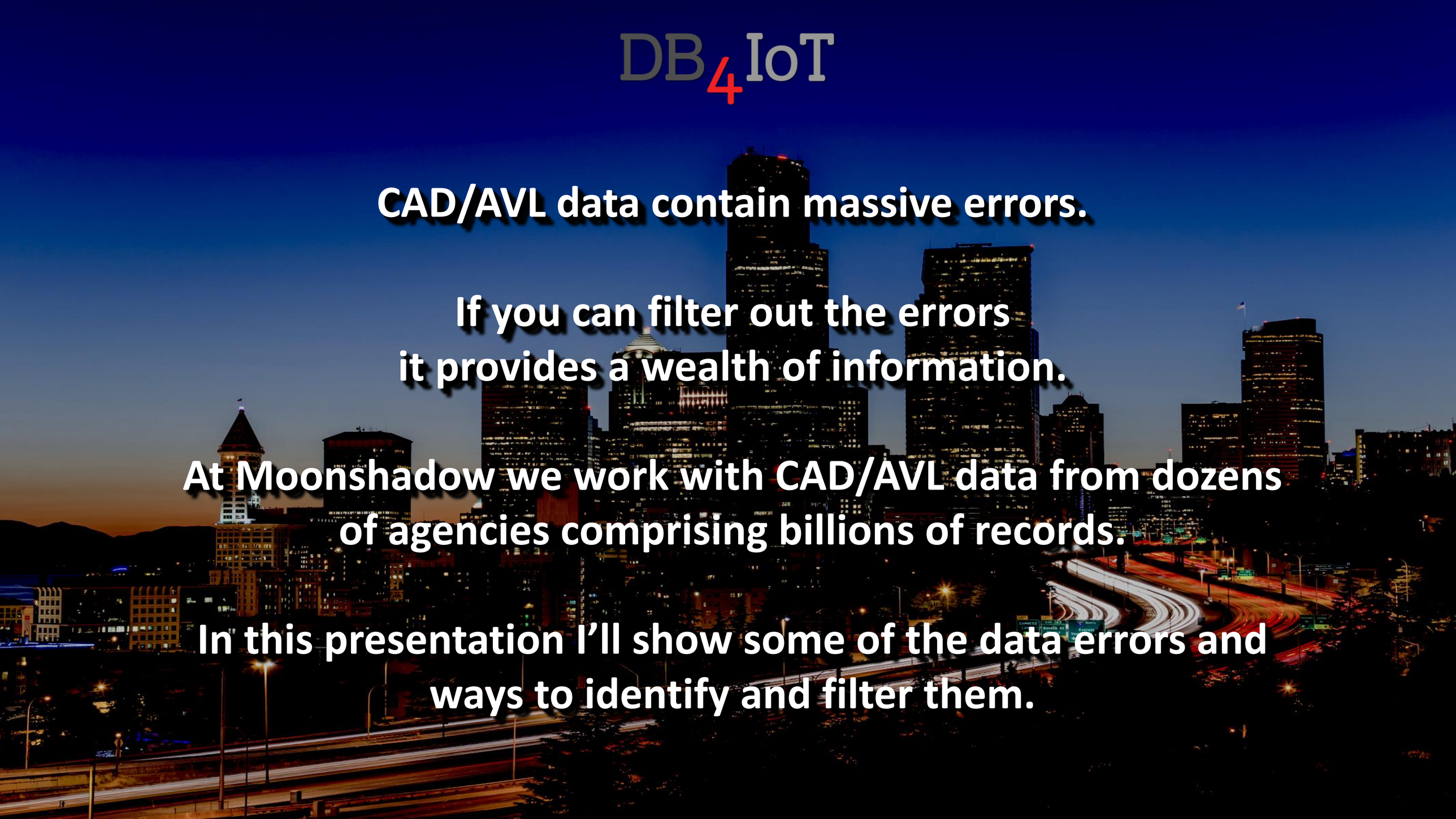
We already collect detailed information on run times
in our CAD/AVL systems.
The data is free
The data is representative
You can go back in time
You can do before, during and after comparisons
But . . .



CAD/AVL data contain massive errors.

If you can filter out the errors
it provides a wealth of information.

At Moonshadow we work with CAD/AVL data from dozens of agencies comprising billions of records.

In this presentation I'll show some of the data errors and ways to identify and filter them.

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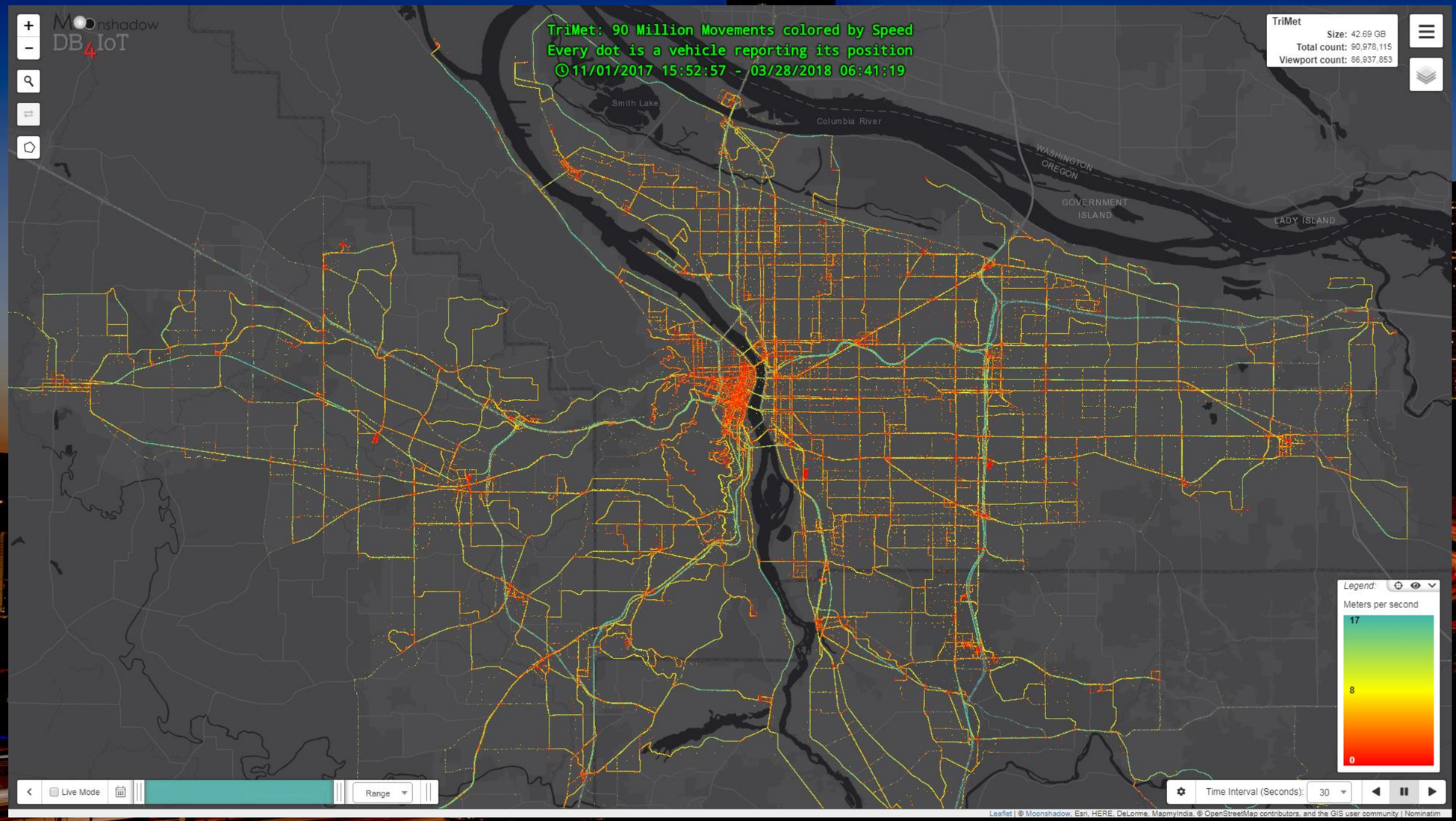
What does CAD/AVL data look like?



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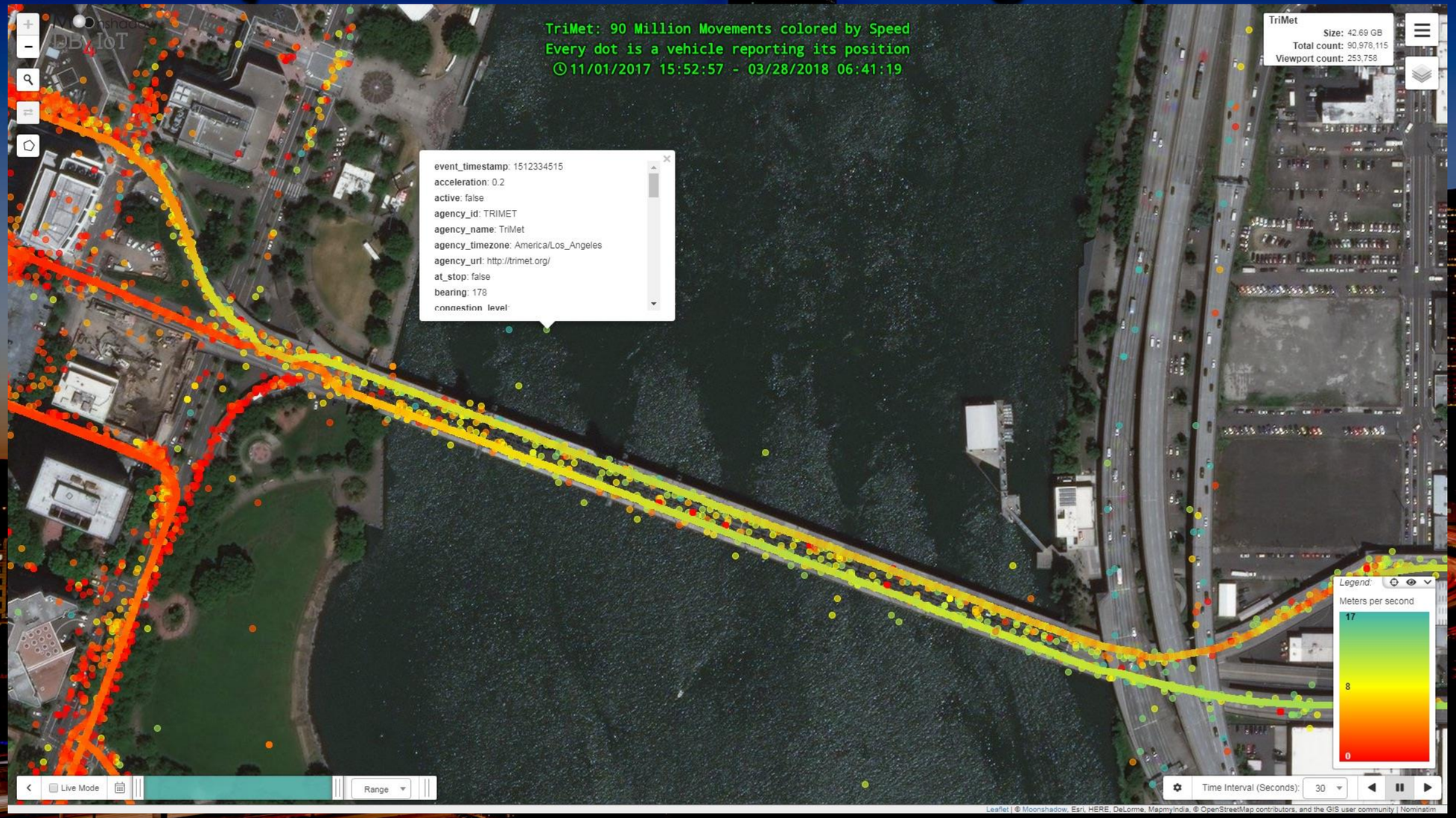
Every dot is a vehicle reporting its position



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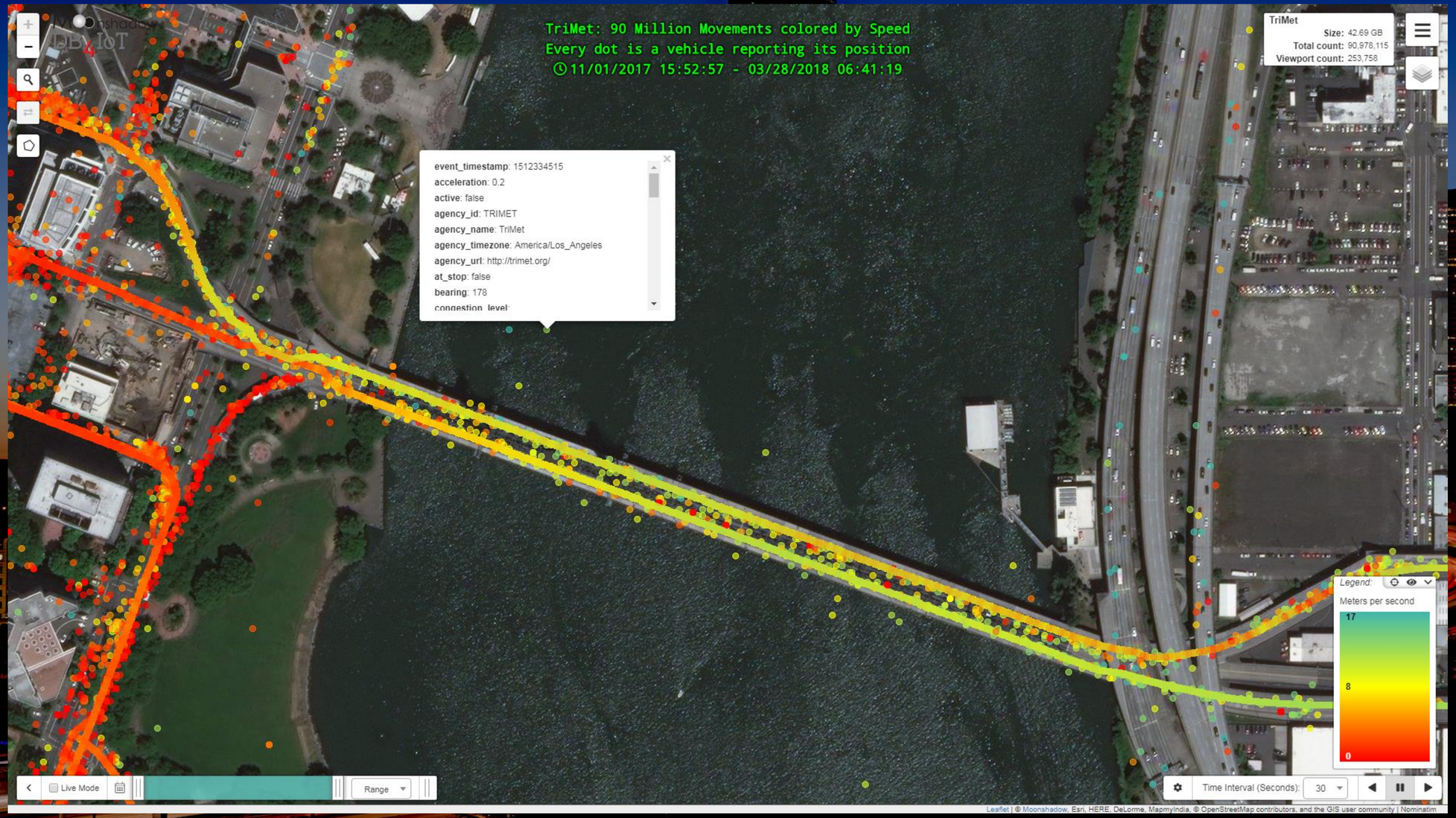
GPS Errors: TriMet buses in the Willamette River



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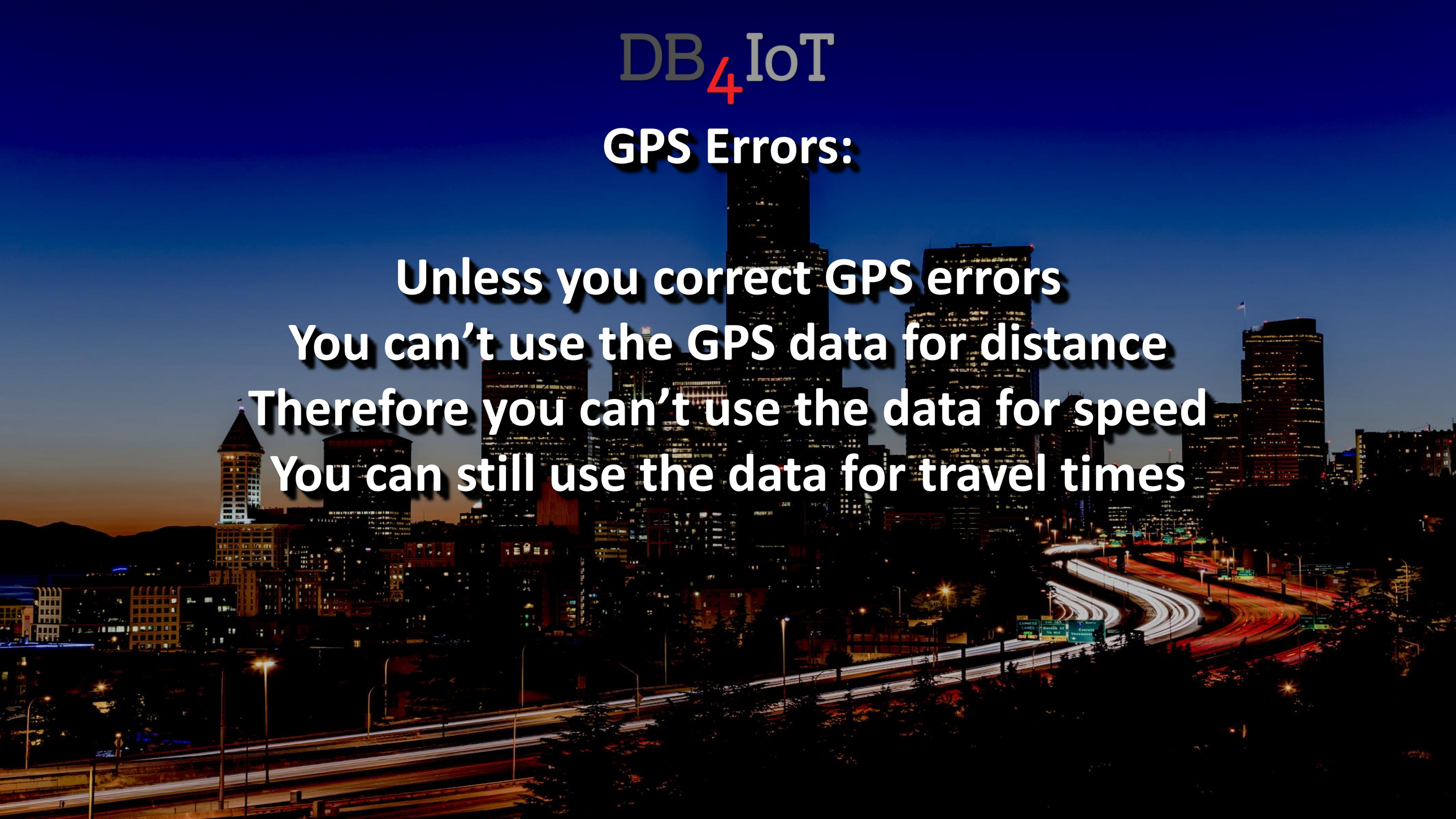
GPS Errors:

Unless you correct GPS errors
You can’t use the GPS data for distance
Therefore you can’t use the data for speed
You can still use the data for travel times



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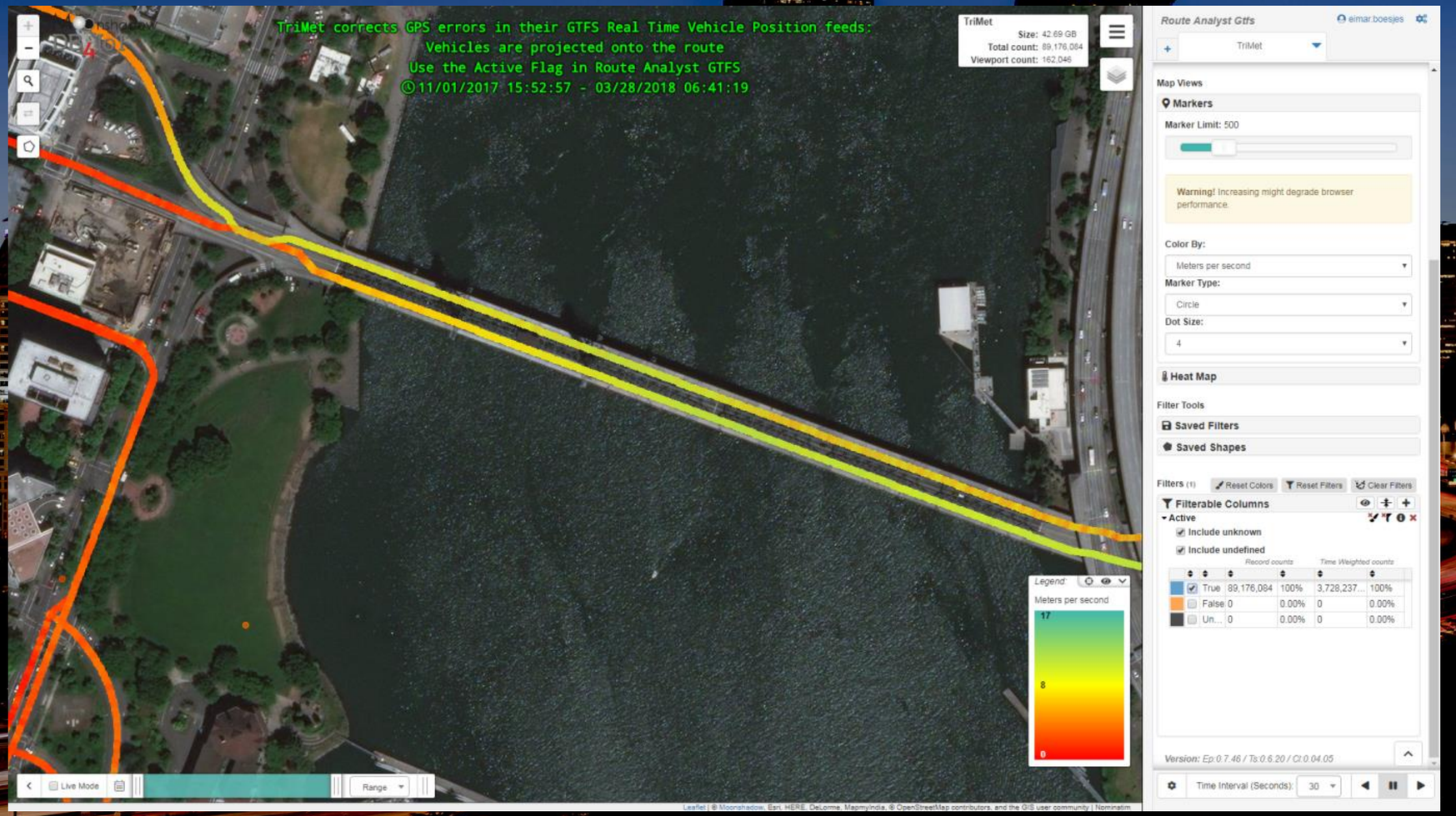
TriMet corrects GPS Errors in their GTFS vehicle position feeds



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Erroneous records can be filtered out with distance to shape

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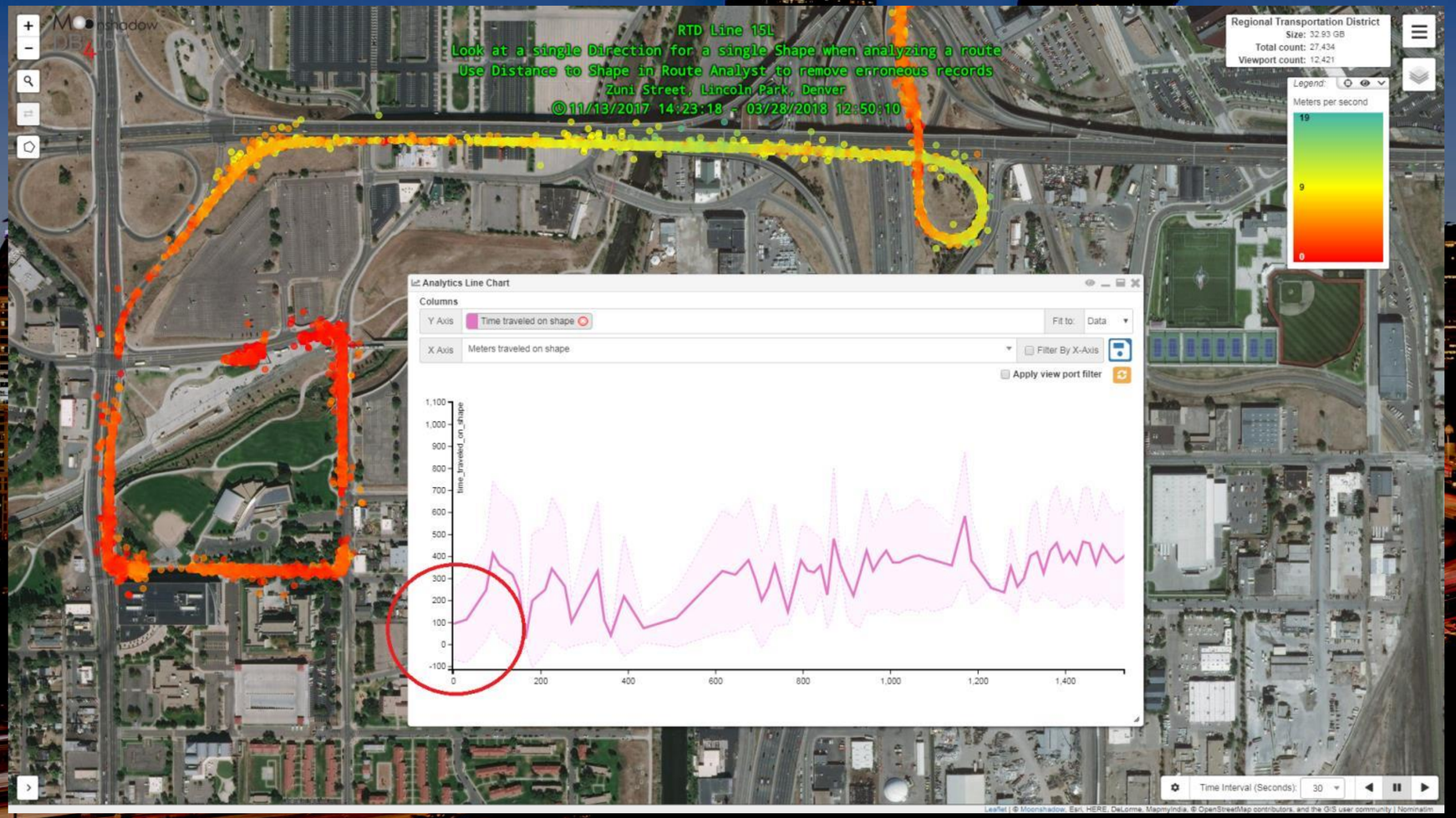
Route Logging is started too early
As a result the start time is not zero



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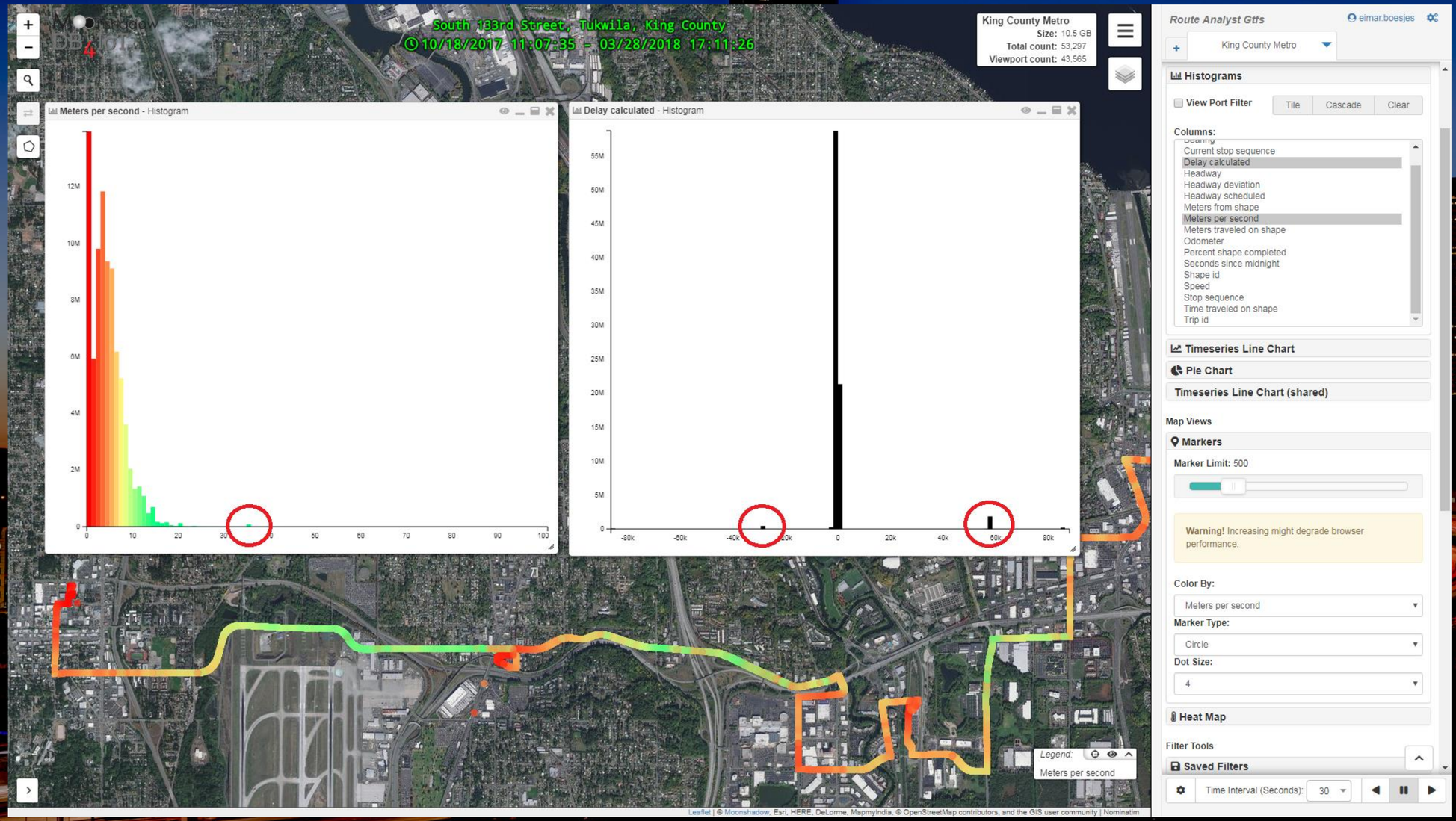
Histograms show outliers to filter out



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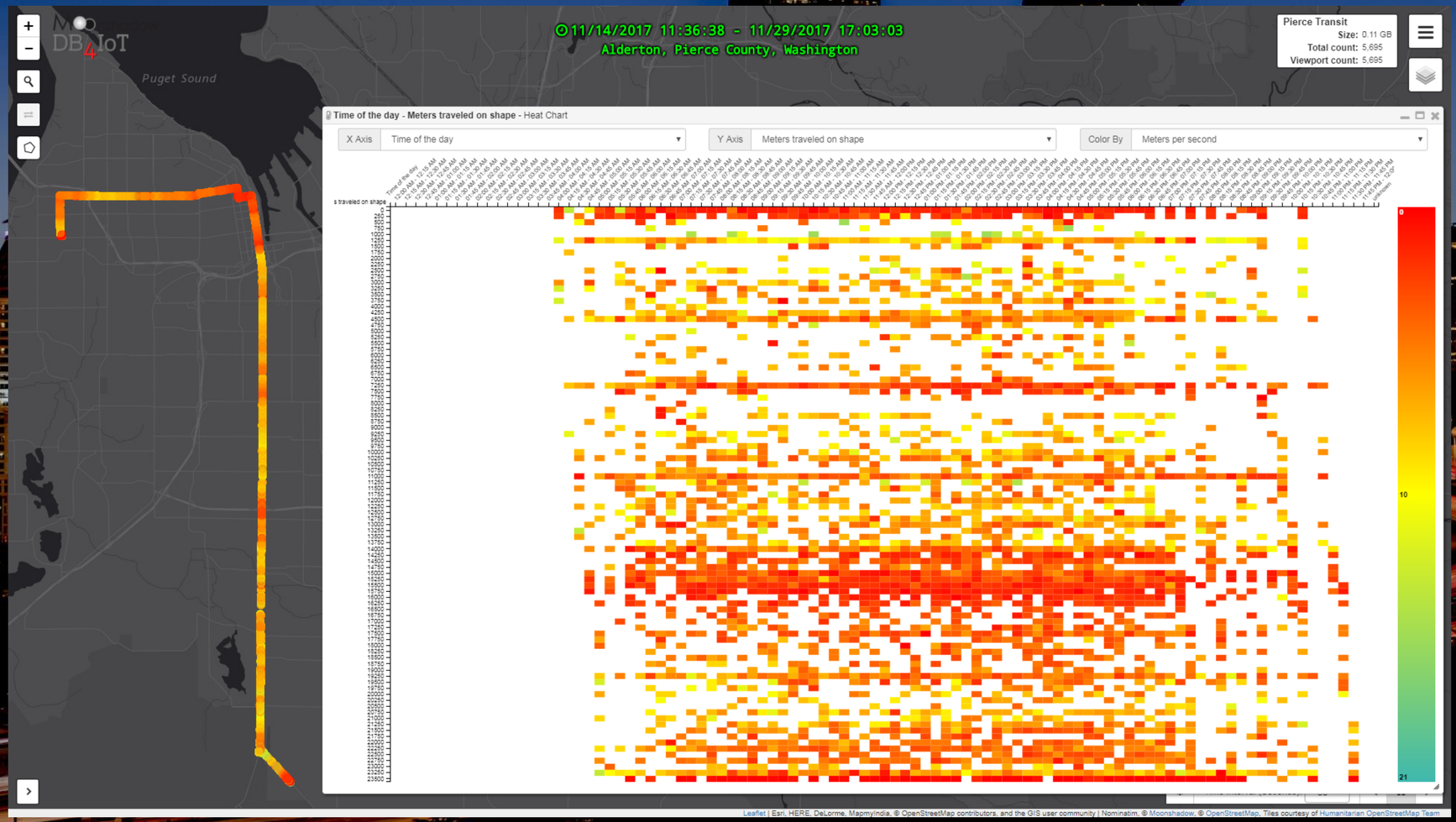
White Space = No Data

CAD/AVL Systems don't report 30 seconds after service stops



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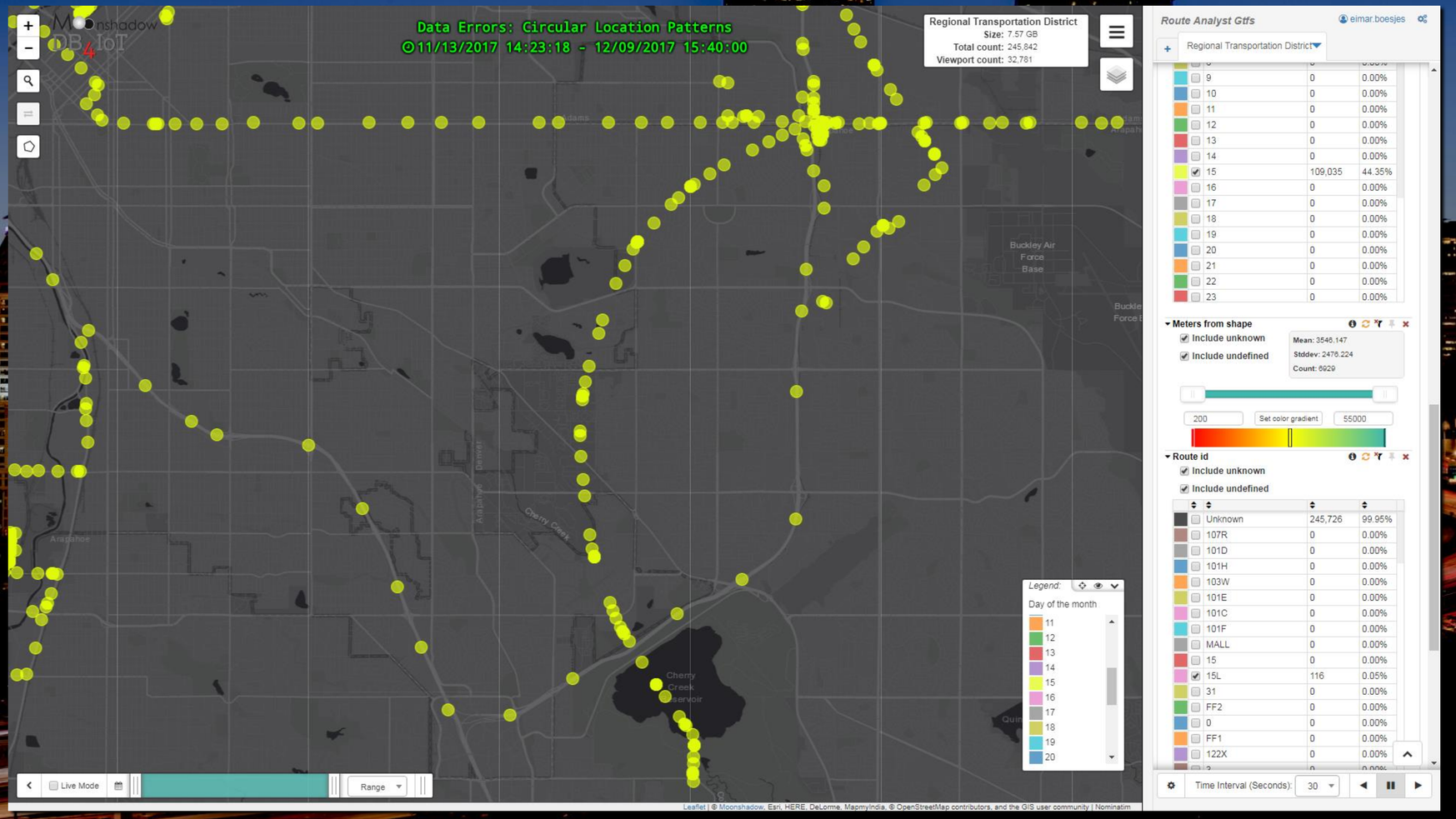
Data Errors: Circular Patterns

Patterns become clear only when the data is mapped



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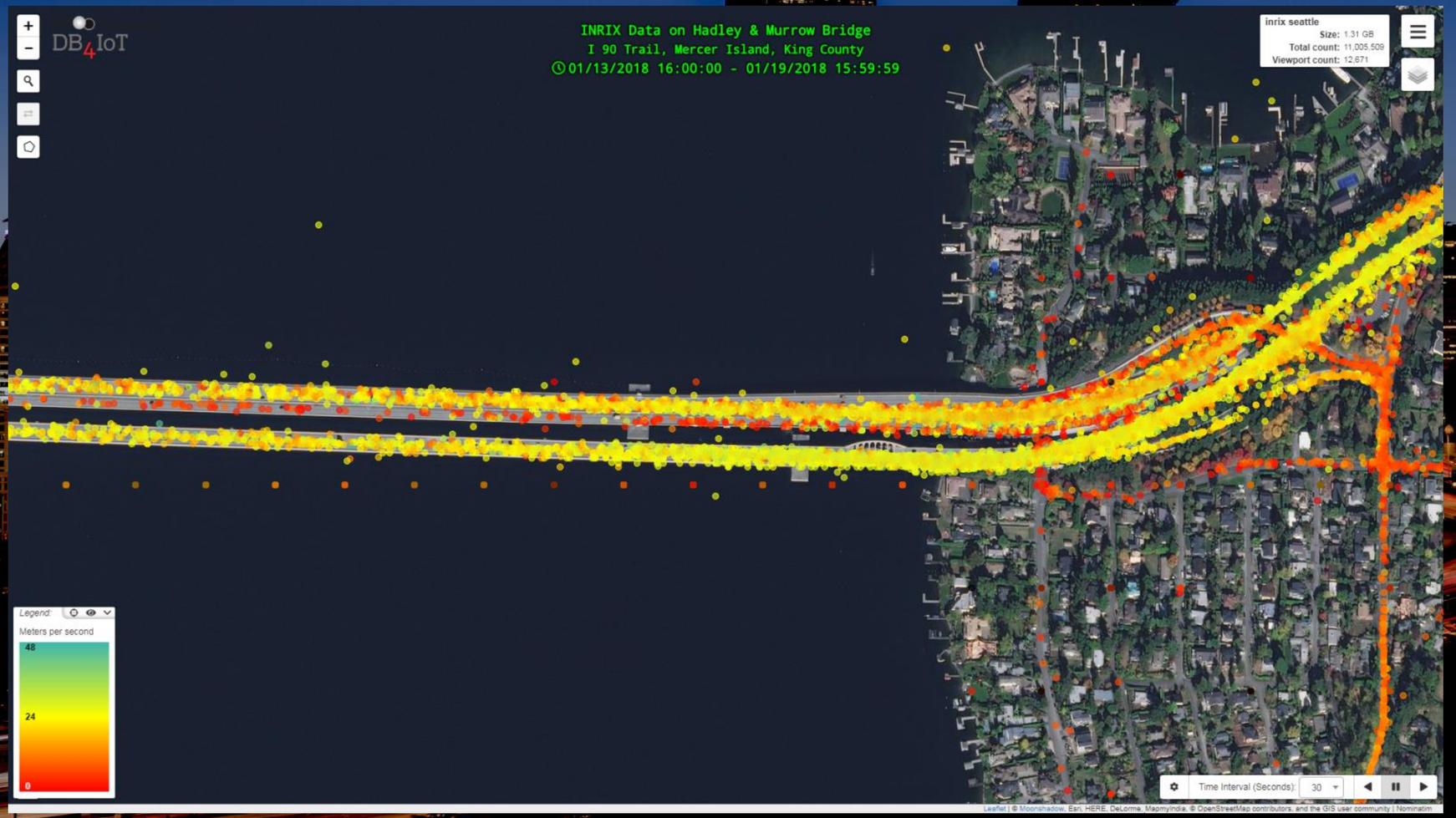
INRIX Data shows traffic is slow on the Westbound left lane
Are these data errors?



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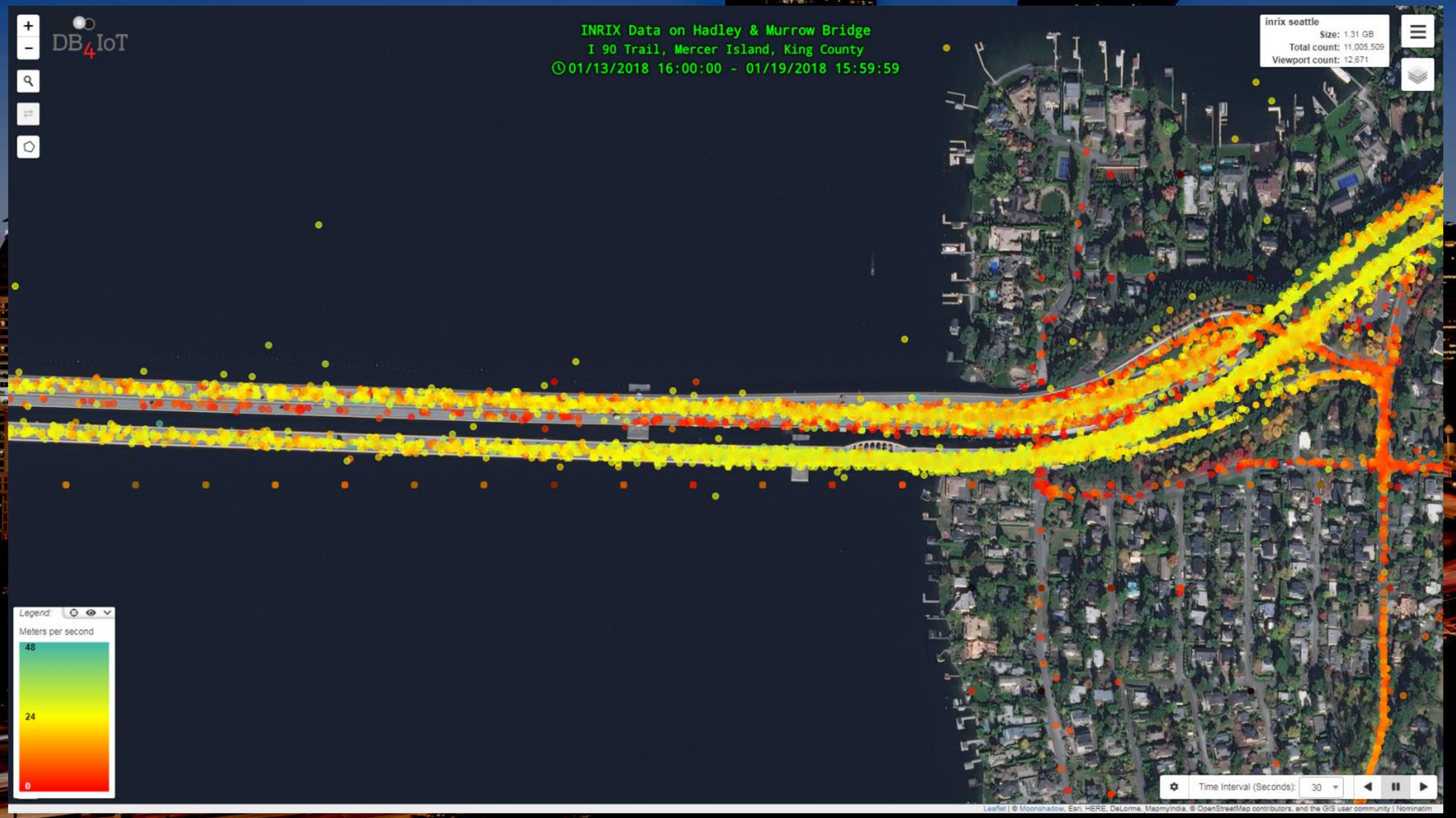
The Westbound left lane is under construction and we're seeing construction traffic.



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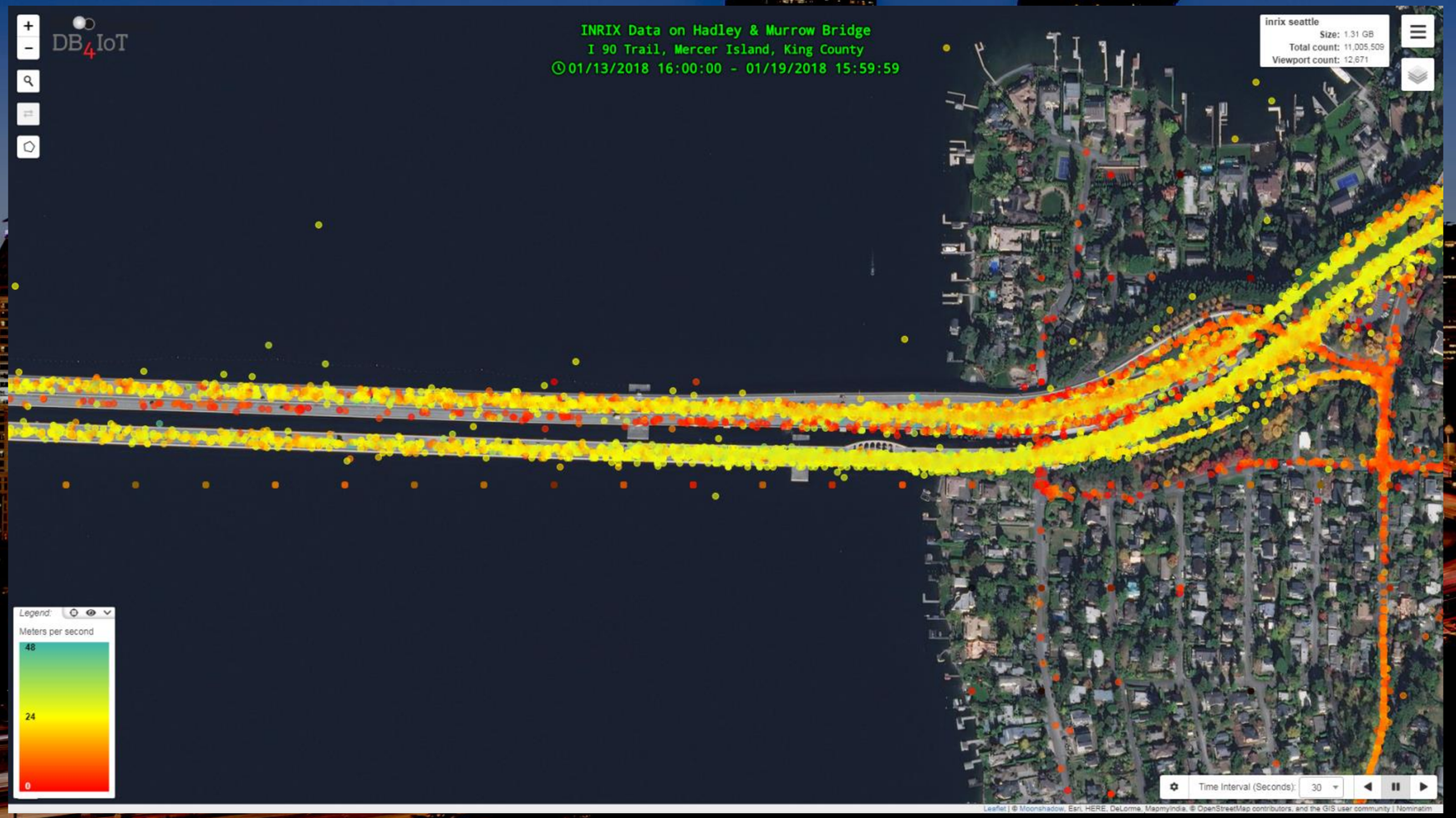
When analyzing data always know the local situation



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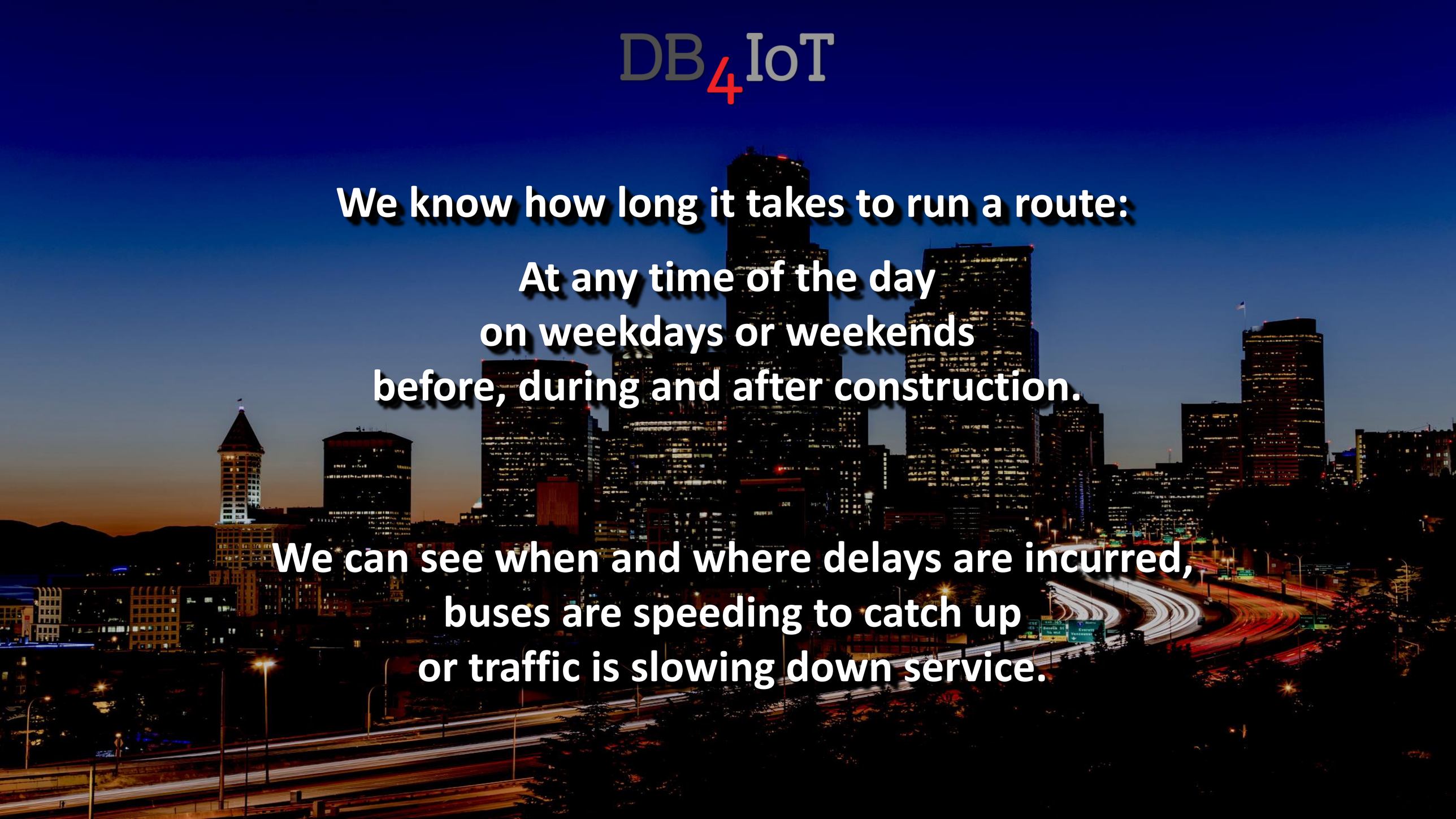
We started with a Simple Question:

How long does it take my bus to run this route?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We know how long it takes to run a route:
At any time of the day
on weekdays or weekends
before, during and after construction.
We can see when and where delays are incurred,
buses are speeding to catch up
or traffic is slowing down service.

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CAD/AVL Data can provide a wealth of information

However,
Drawing conclusions from CAD/AVL data requires:

Public transit expertise
Big data expertise
Knowledge of the local situation
Data visualization to identify errors

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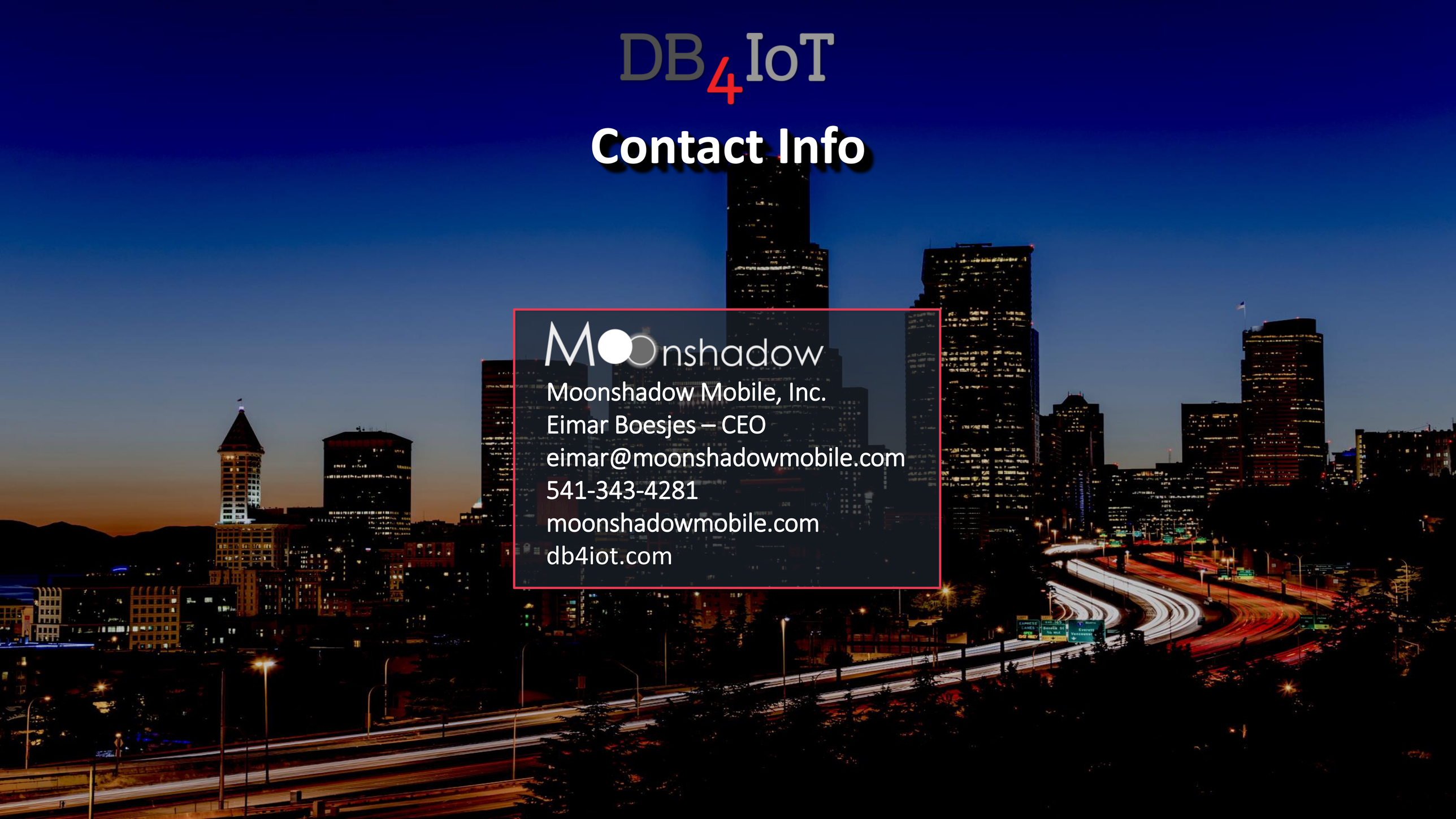
Contact Info



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