PTV xServer 2.0.0 Benchmark Report Linux

Introduction

This PTV xServer Benchmark Report visualizes different aspects of a PTV xServer's performance like response times, scalability and throughput.
The report is categorized by type of service, type of considered map data and transportation technology. All results are client side measurements.

Hardware Environment

The following specifications describe the host system that is used for benchmarking in this report. These specifications are no PTV xServer system requirements, they just describe a possible productive environment. The benchmarks are run on a HEWLETT-PACKARD DL360 G9 server with:

- 2 x Intel Xeon E5-2620v3 2.4 GHz(6 Cores, Hyper-Threading, 15M Cache)
- 96 GB DD4-2133 ECC
- 500 GB HD SAS, 7200 rpm
- 1 GBit Ethernet

Software Environment

The operating system is a Ubuntu Linux 16.04 default installation without any special performance tweaks.
The xServer installation default configuration has been changed to provide:

- 12 module instances
- A request queue size of 50

Map Data

The data basis provides a PTV World City Map 2016.2T(TomTom/2015.12) that contains:

- PTV_TimeZones FeatureLayer
- Elevation data
- Toll data
- HBEFA 3.2 emission data
- COPERT Australia emission data
- Emission factors for CEN 2012, UK DEFRA 2014, CO_2 Decree France 2011 and Australia NGA 2015
- PTV_TruckAttributes FeatureLayer
- PTV_RestrictionZones FeatureLayer
- PTV_PreferredRoutes FeatureLayer

xMap Service

The sections visualizes the performance of the xMap service. All tests measure the raw rendering performance of static tiles. Neither the performance influence of tile caches nor interactive map toolkits like Leaflet or OpenLayers are considered.

Test Suite Descriptions

For the zoom levels 20 to 8 the xMap test data is composed of 15 map sections. Each map section consists of 10x10 tiles located in:
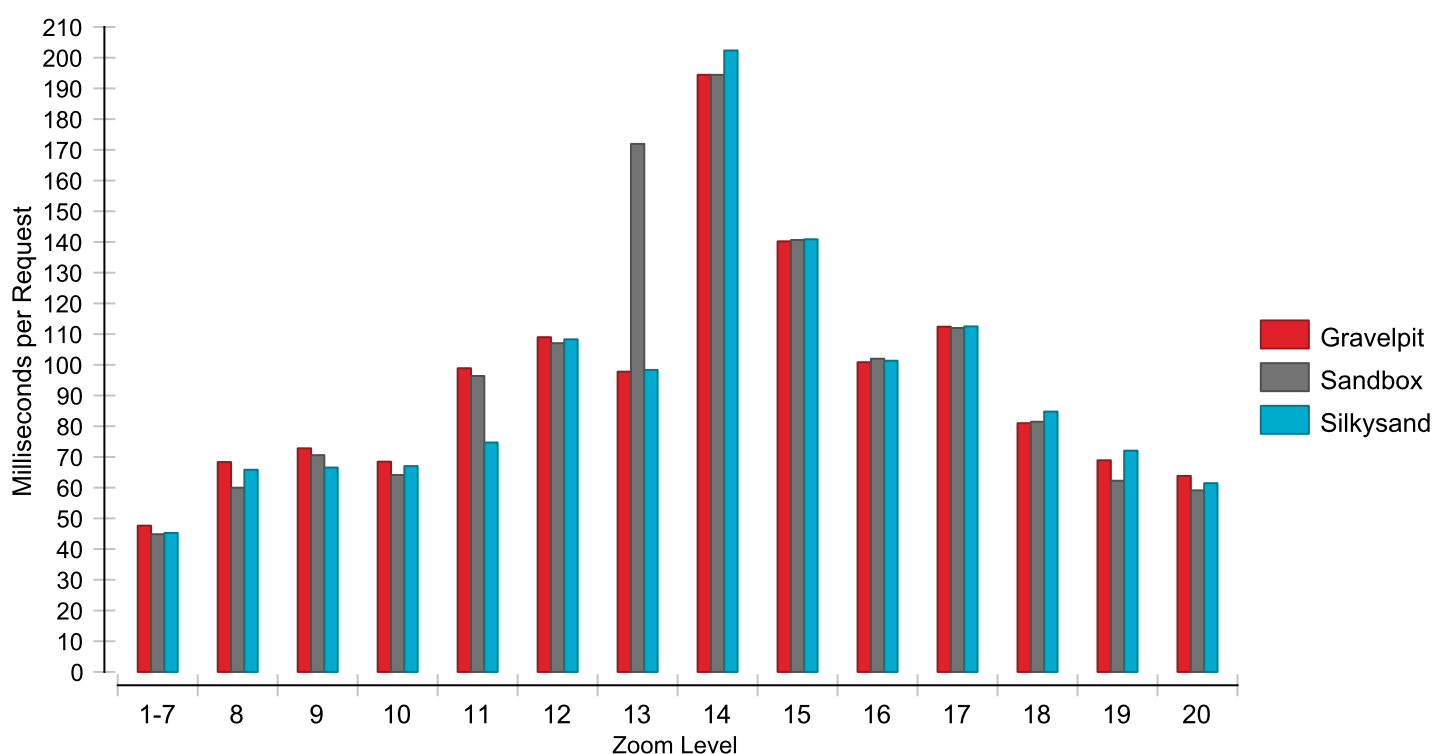
- Europe: Athens, London, Moskow, Paris, Reykjavik
- Australia: Alice Springs, Auckland, Melbourne, Sydney, Perth
- North America: Anchorage, Dallas, Mexico City, New York City, Toronto

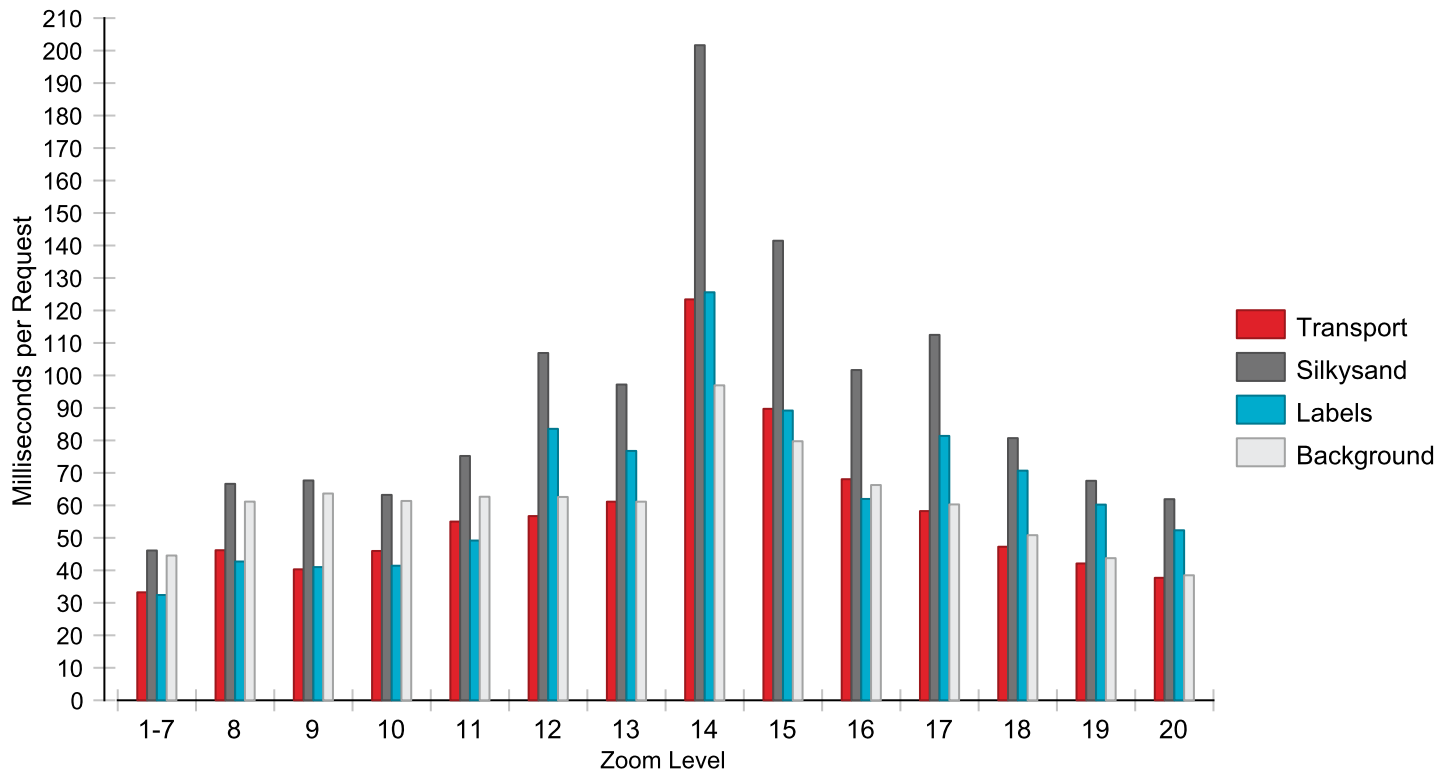For zoom levels 7 to 1 all tiles are rendered.

Response Times

The response time section shows the influence of map and response data on interactive use cases. All response time tests are measured using one client and one service module.
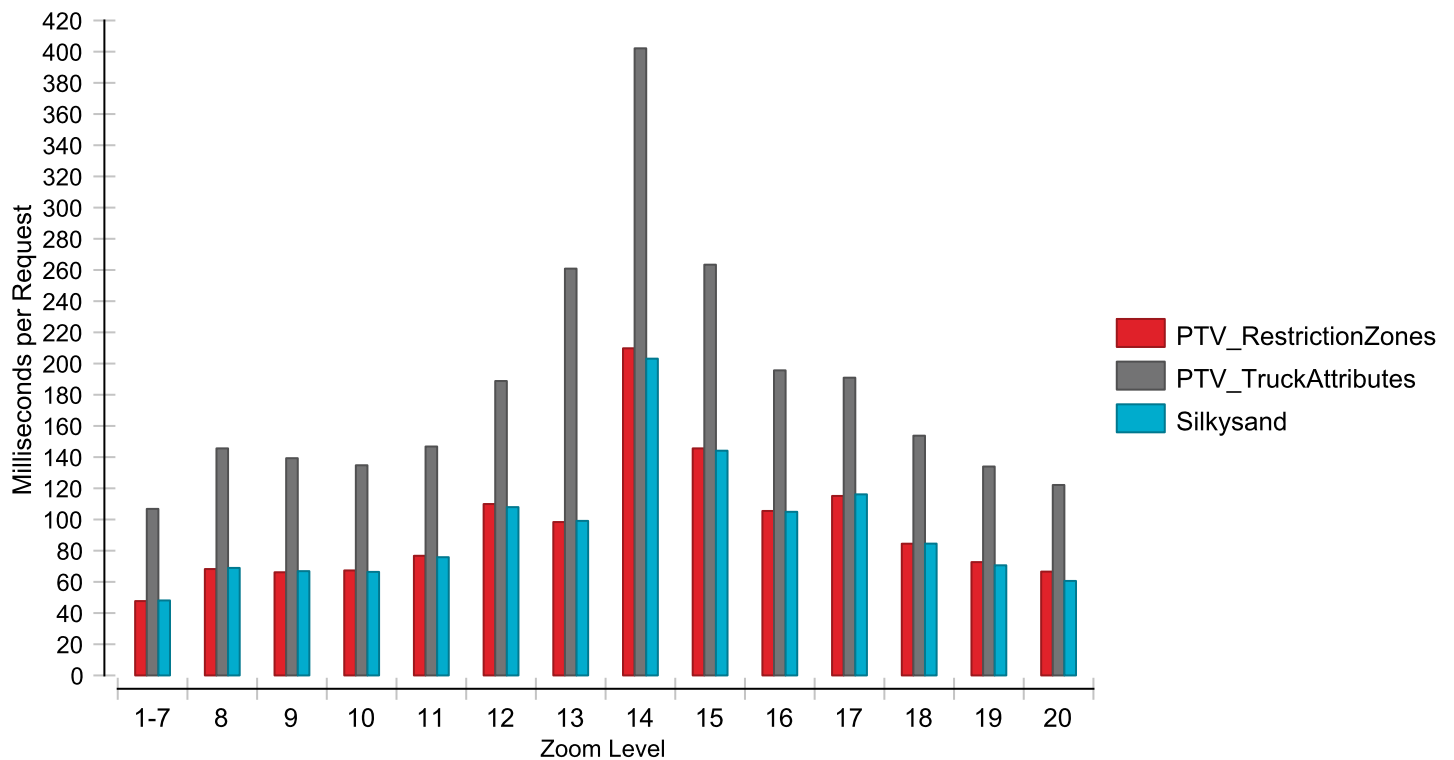
xMap Response Times - Rendering with different Profiles

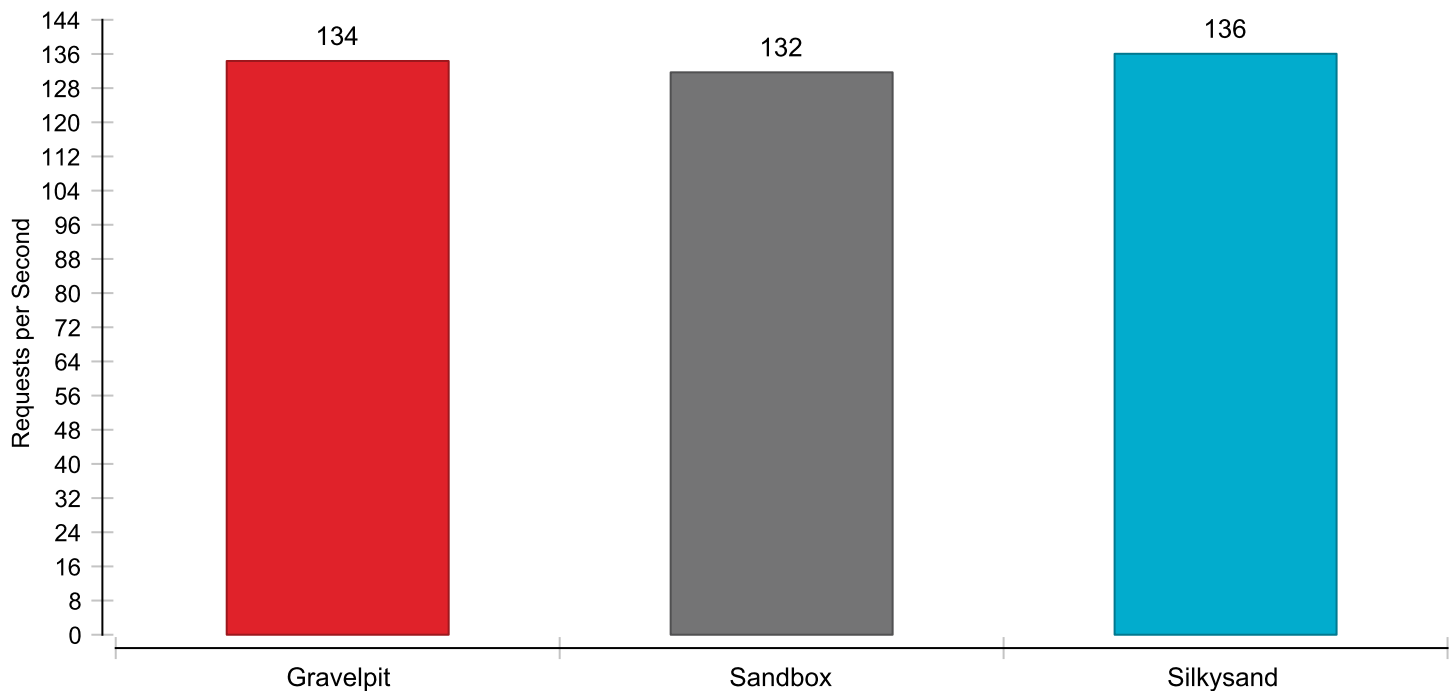**xMap Response Times - Rendering Base Layer Tiles**

Legend:
- Transport
- Silkysand
- Labels
- Background

Y-axis: Milliseconds per Request
X-axis: Zoom Level (1-7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20)

xMap Response Times - Rendering Feature Layer Tiles

Legend:
- PTV_RestrictionZones
- PTV_TruckAttributes
- Silkysand

Y-axis: Milliseconds per Request
X-axis: Zoom Level (1-7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20)

Throughput

The throughput section shows the influence of different factors on the system throughput. Except for the scaling tests all throughput tests are measured using 50 clients and 10 service modules. All zoom level from 20 to 1 are rendered.
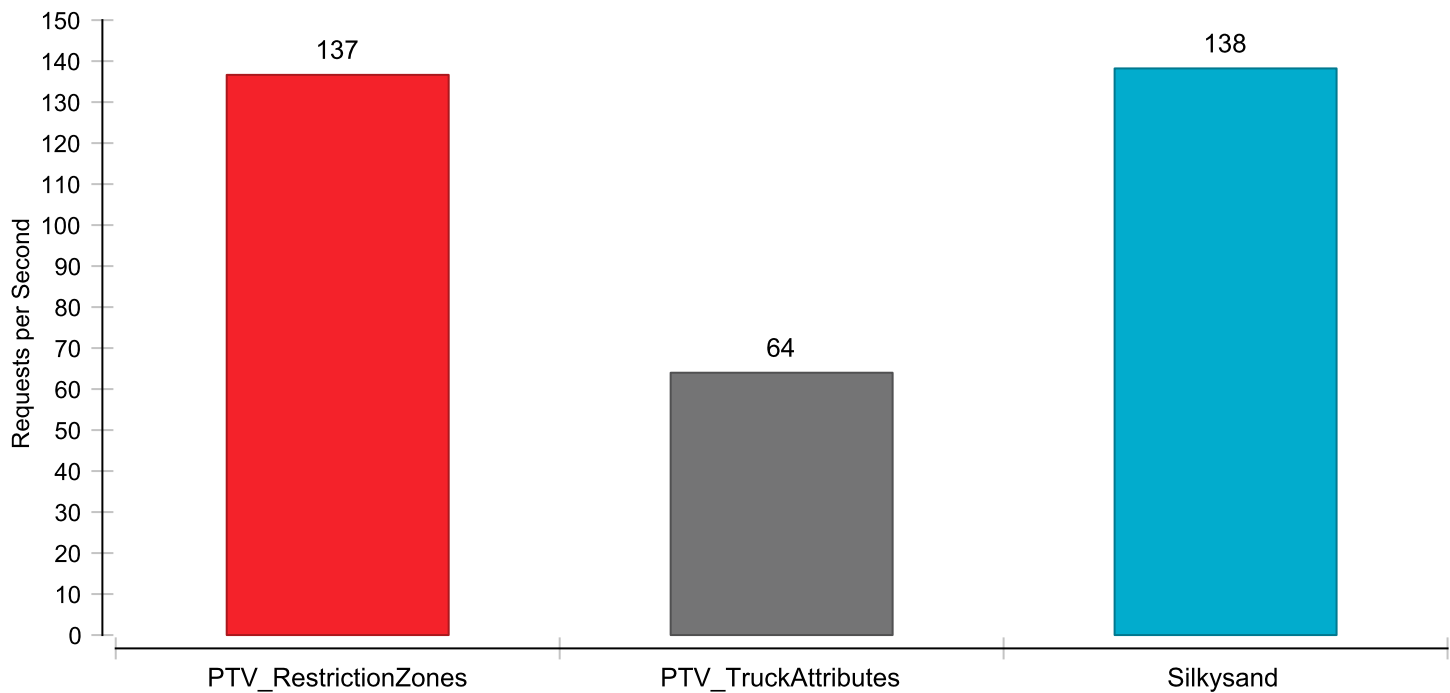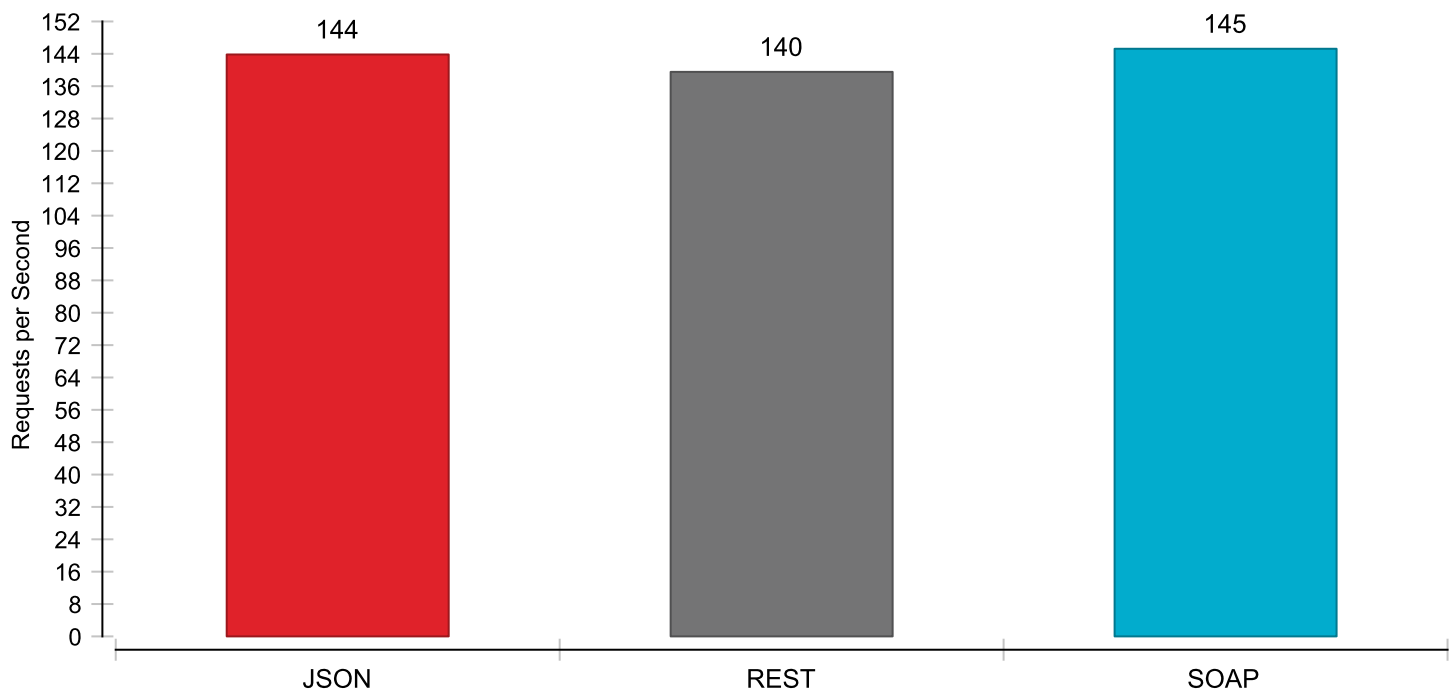
xMap Throughput - Profiles

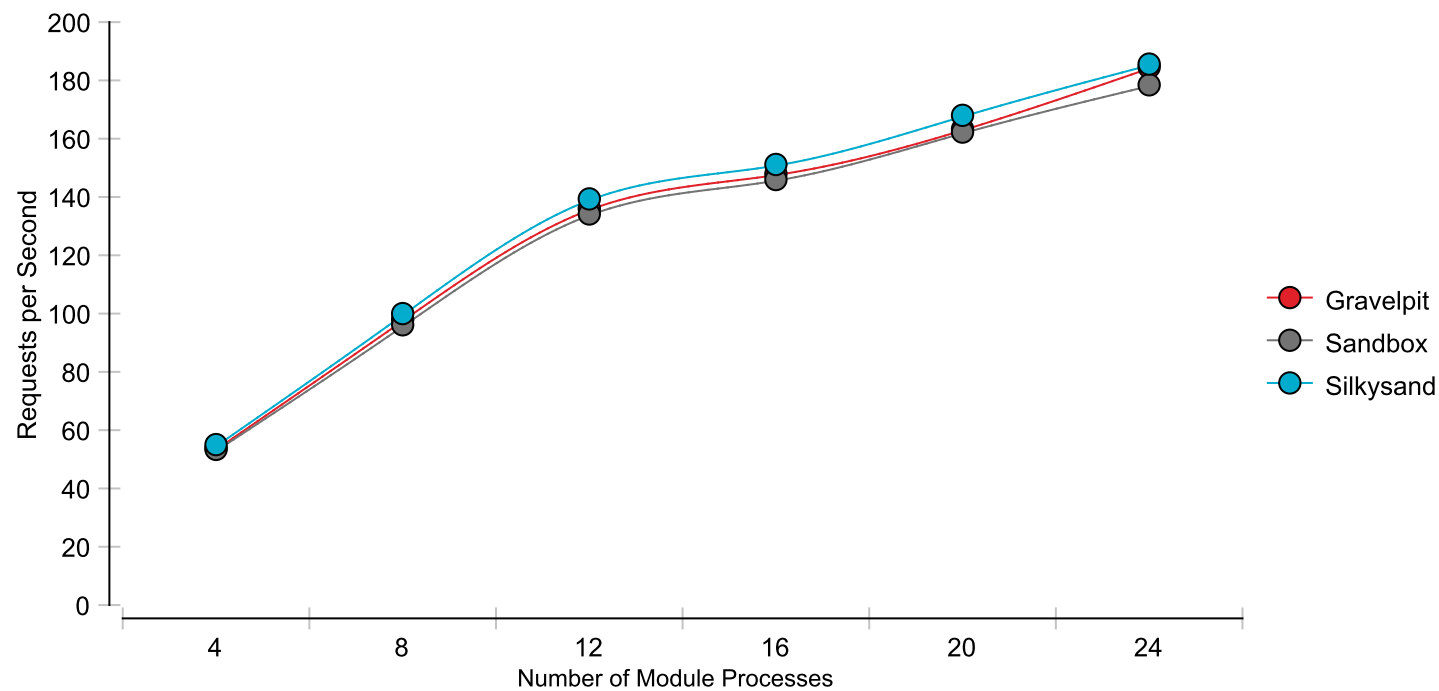**xMap Throughput - Rendering Base Layer Tiles**

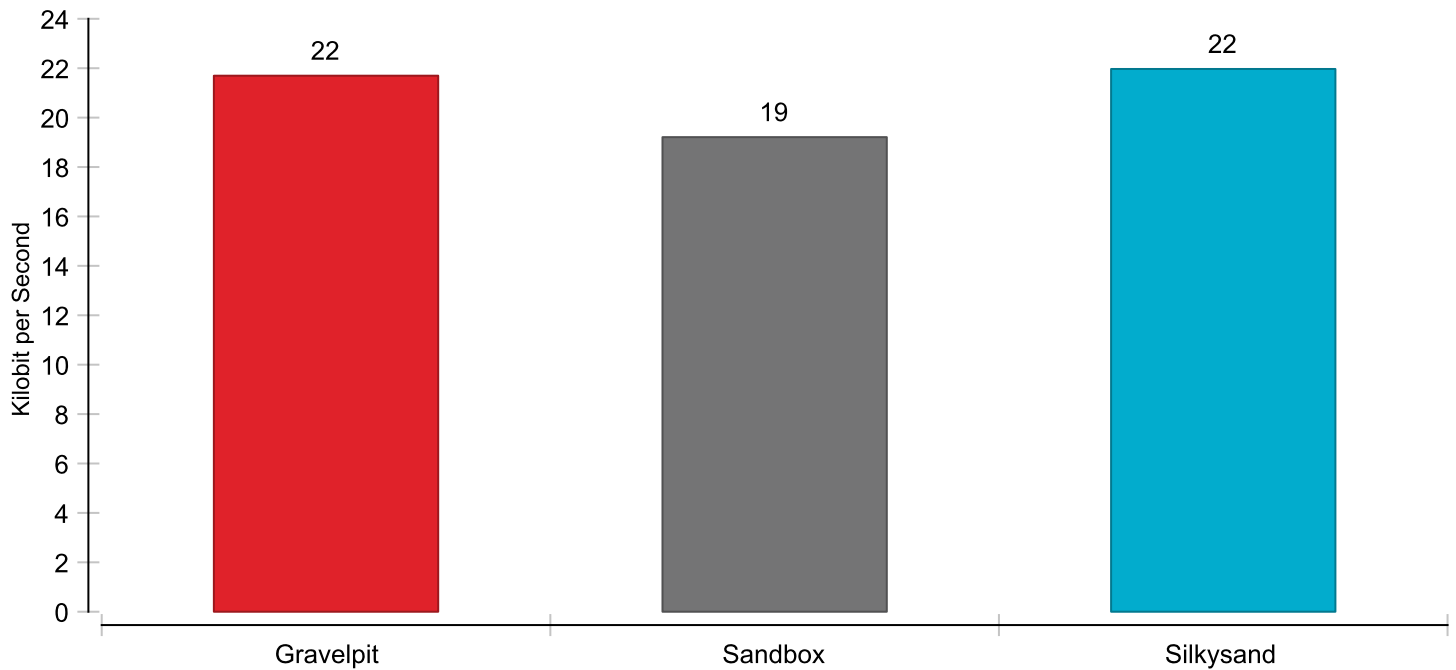**xMap Throughput - Rendering Feature Layer Tiles**

Bar chart titled "xMap Throughput - Rendering Feature Layer Tiles", Y-axis "Requests per Second" (0–150):
- PTV_RestrictionZones: 137
- PTV_TruckAttributes: 64
- Silkysand: 138

xMap Throughput - Service Types

Bar chart titled "xMap Throughput - Service Types", Y-axis "Requests per Second" (0–152):
- JSON: 144
- REST: 140
- SOAP: 145

xMap Throughput - Module Scaling

Bandwidth

The bandwidth section shows the bit-rate that is needed for different use caes. All bandwidth tests are measured using 50 clients and 12 service modules. All zoom level from 20 to 1 are rendered.
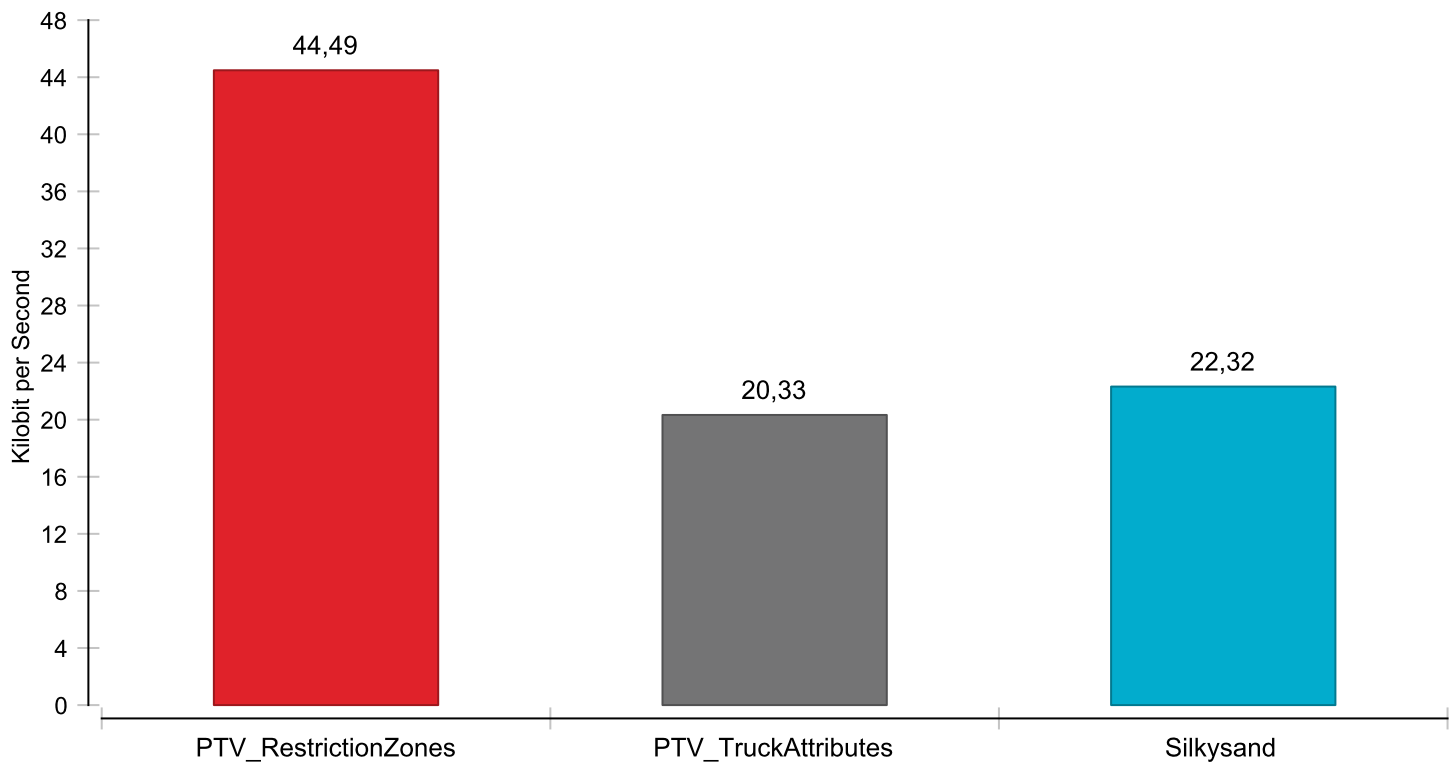
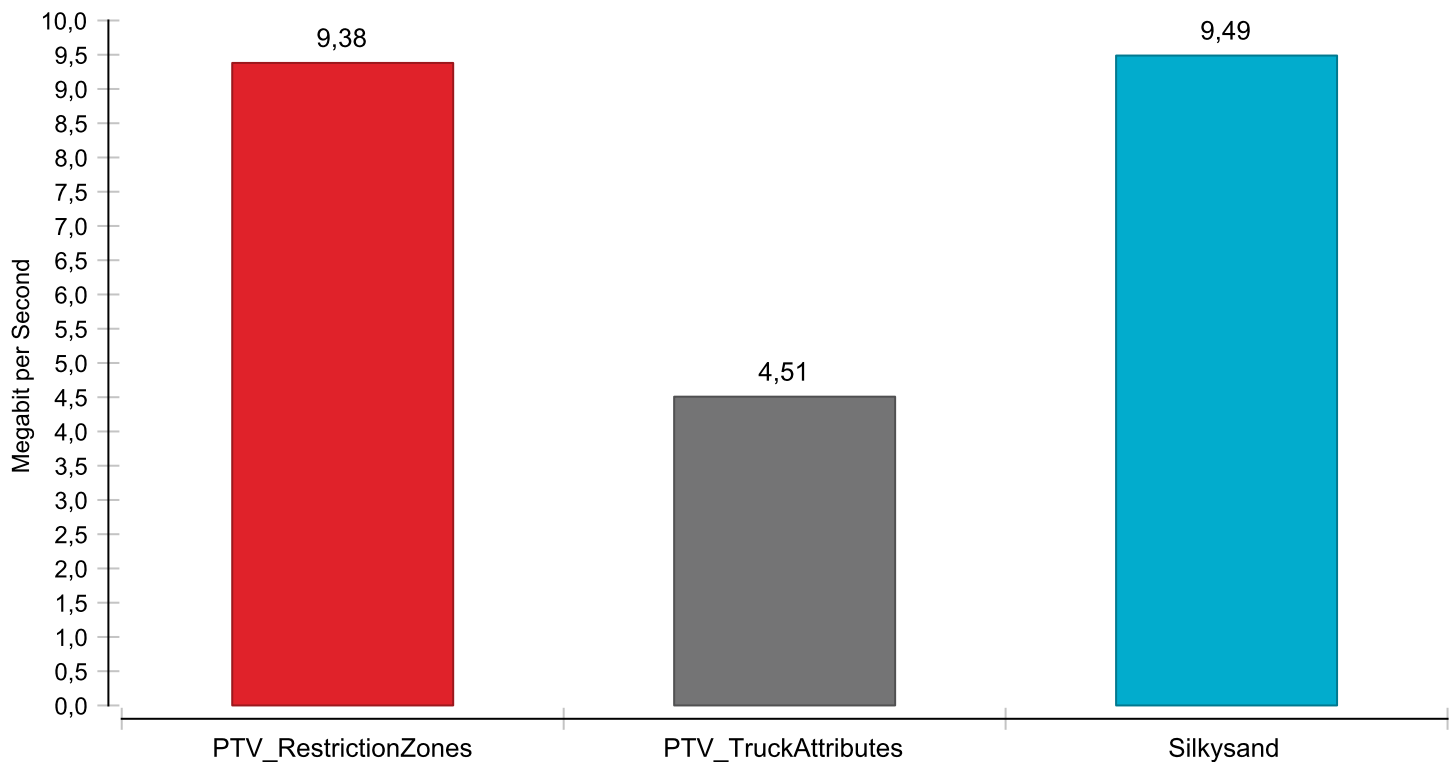**xMap Request Bandwidth - Rendering Profiles**

xMap Response Bandwidth - Rendering Base Layer Tiles

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xMap Request Bandwidth - Rendering Feature Layer Tiles

Kilobit per Second

- PTV_RestrictionZones: 44,49
- PTV_TruckAttributes: 20,33
- Silkysand: 22,32

xMap Response Bandwidth - Rendering Feature Layer Tiles

Megabit per Second

- PTV_RestrictionZones: 9,38
- PTV_TruckAttributes: 4,51
- Silkysand: 9,49

xRoute Service

This sections visualizes the influence of different factors like the considered data, the number of stops or the route length on the xRoute service performance.

Test Suite Descriptions

The measured test suites represent three different routing use cases:

- long routes with a 40t truck:
  - 3000 routes with 2 waypoints
  - about 300 km long
  - located in Europe, North America and Australia
- round trips with a 7.5 t truck
  - 3000 located with 10 waypoints
  - 15-40 km long
  - located in 15 city areas in Europe, North America and Australia
- short routes with a car
  - 3000 routes with 2 waypoints
  - about 15 km long
  - located in 15 city areas in Europe, North America and Australia

Response Times

The response time section shows the influence of the considered map and response data on different use cases. All response time tests are measured using one client and one service module.
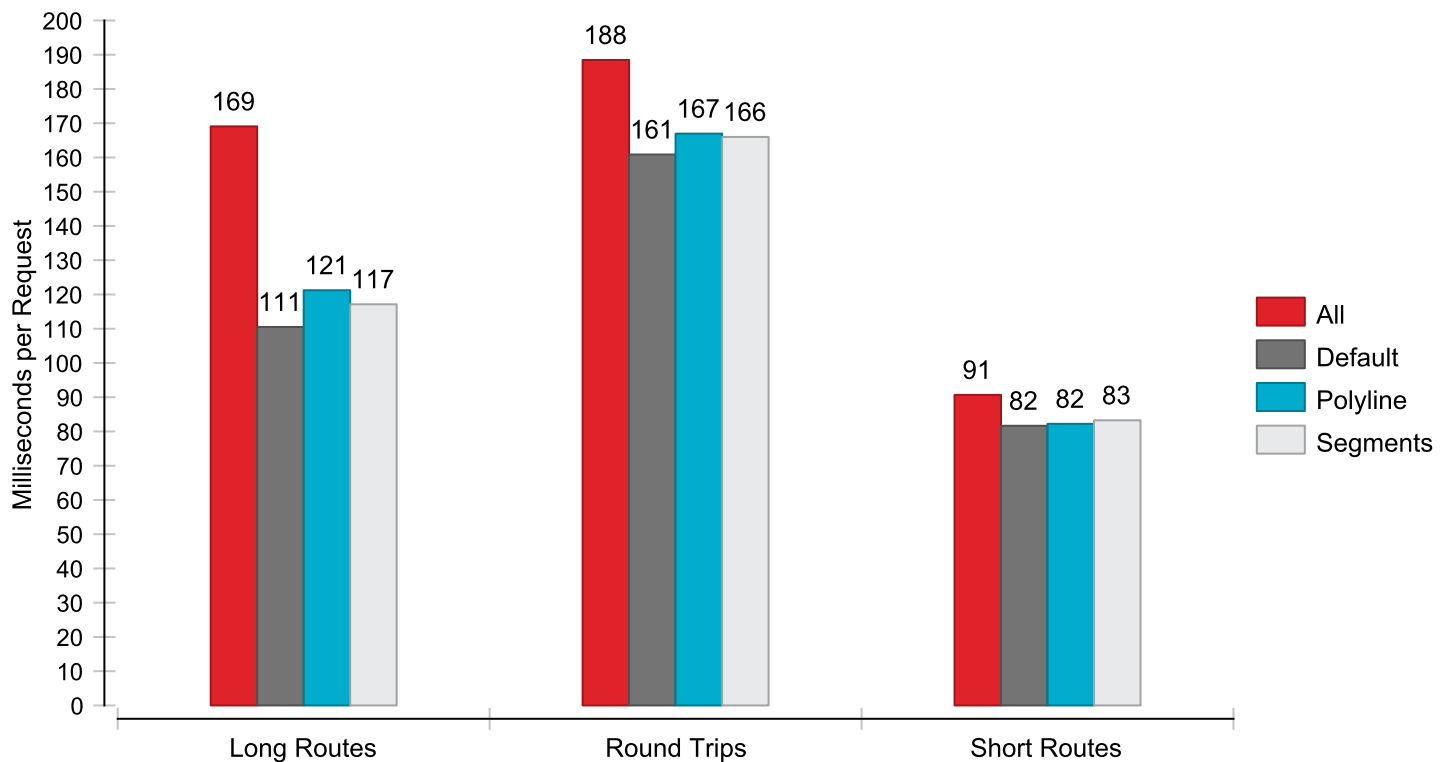
xRoute Response Times - Basic Routing

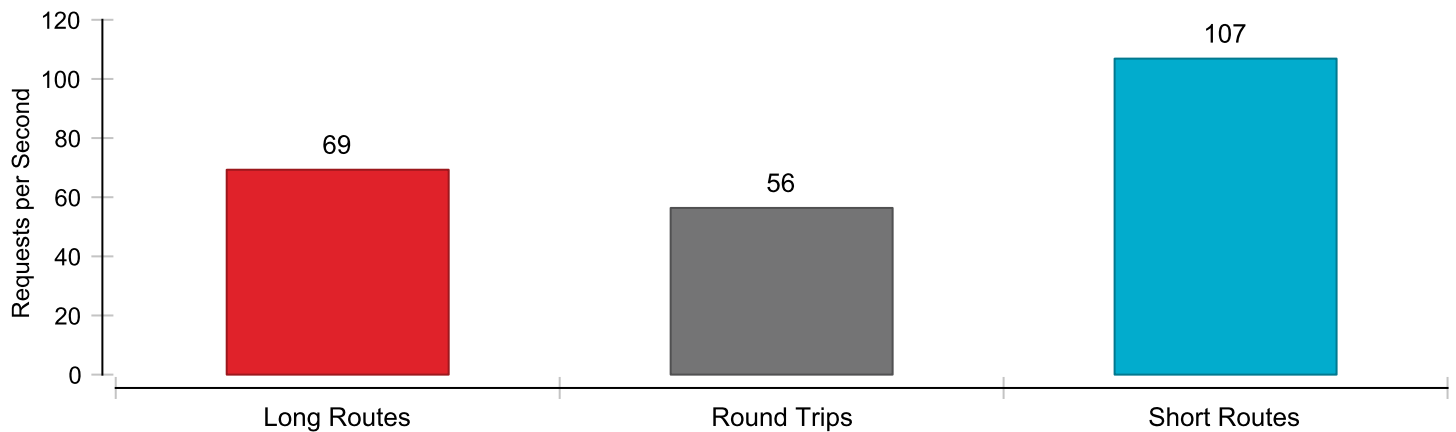**xRoute Response Times - Feature Layer**

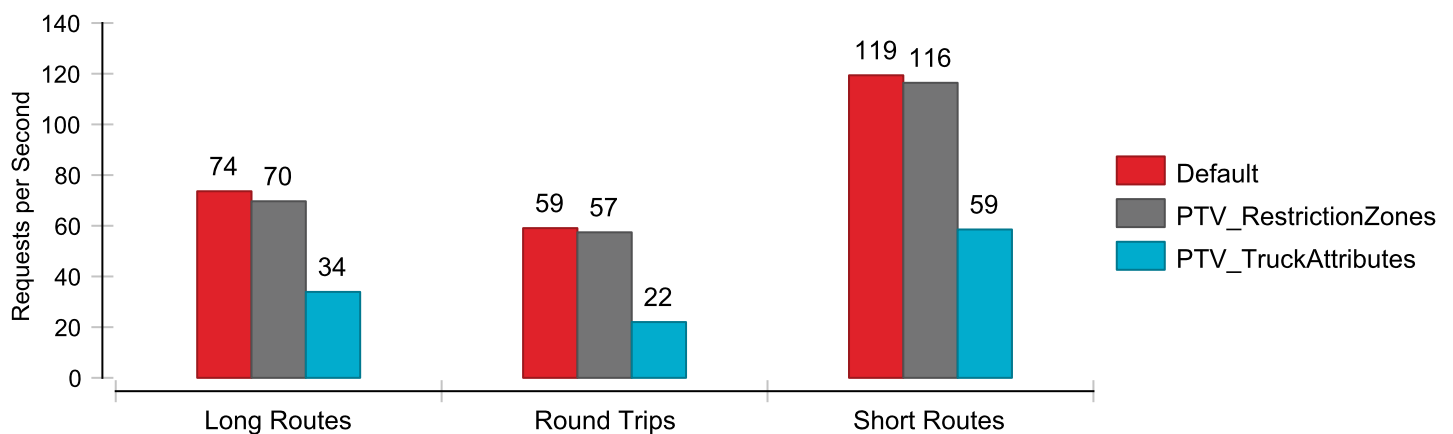**xRoute Response Times - Routing with different Result List Options**

Throughput

The throughput section shows the influence of different factors on the system throughput. Except for the scaling tests all throughput tests are measured using 50 clients and 12 service modules.
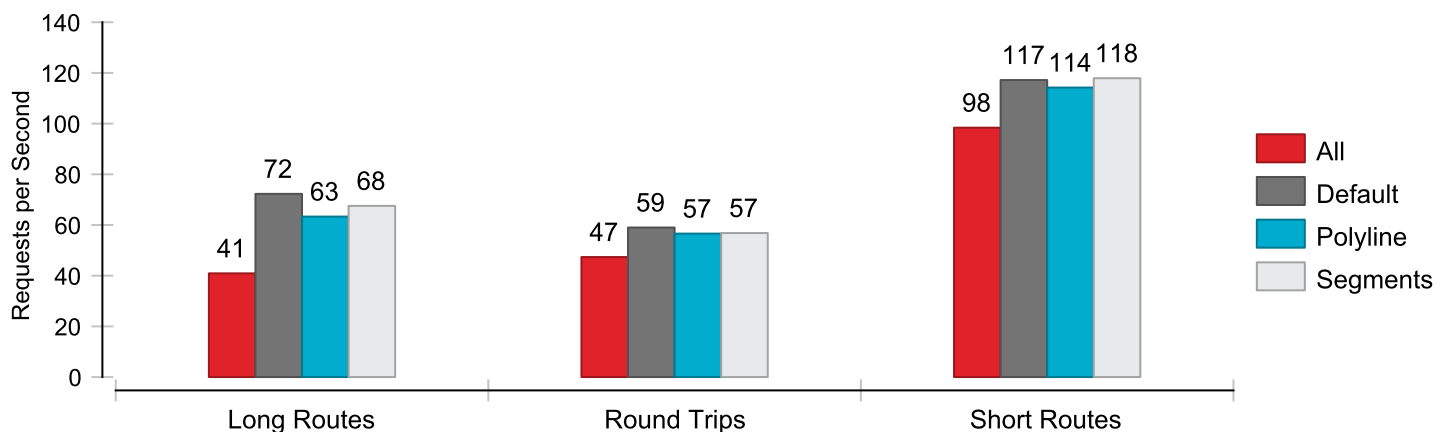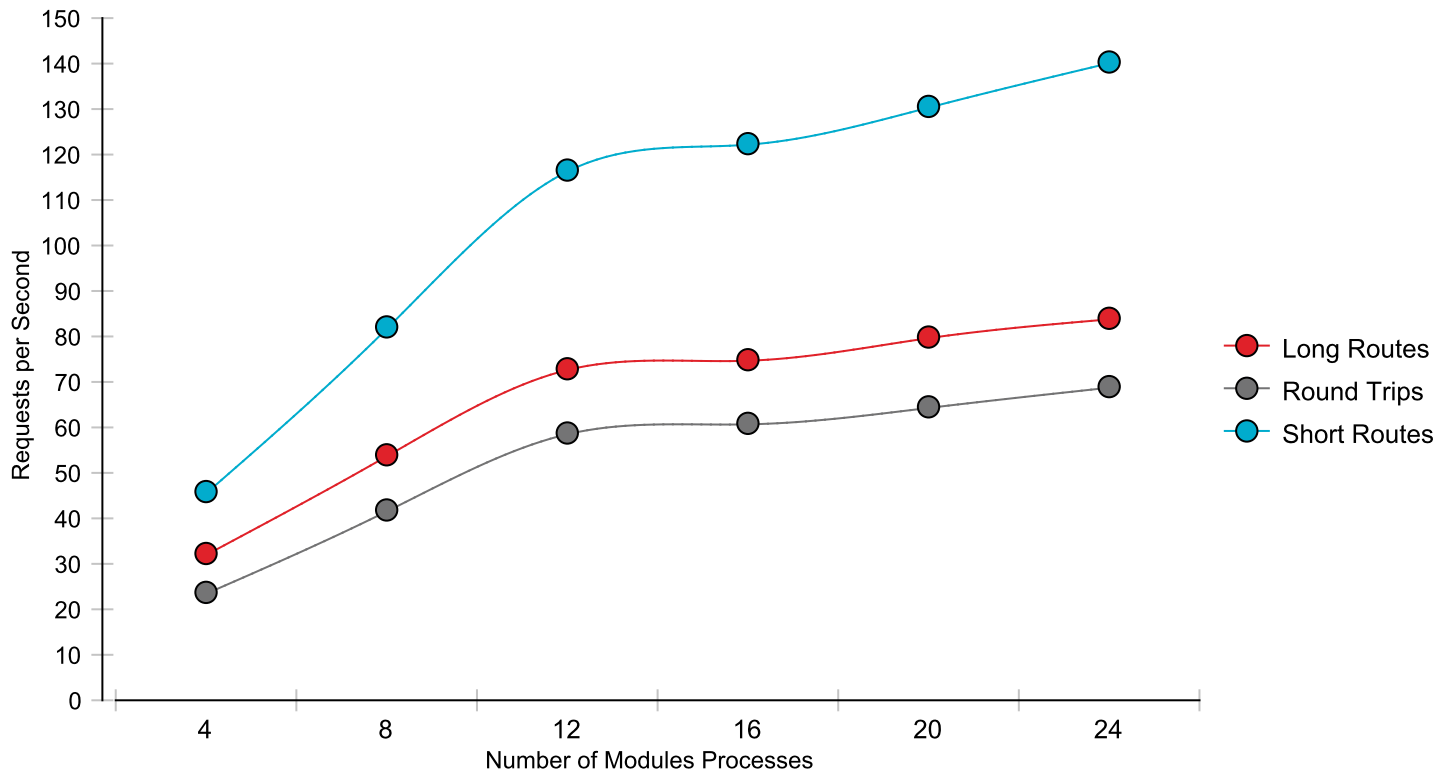
xRoute Throughput - Basic Routing

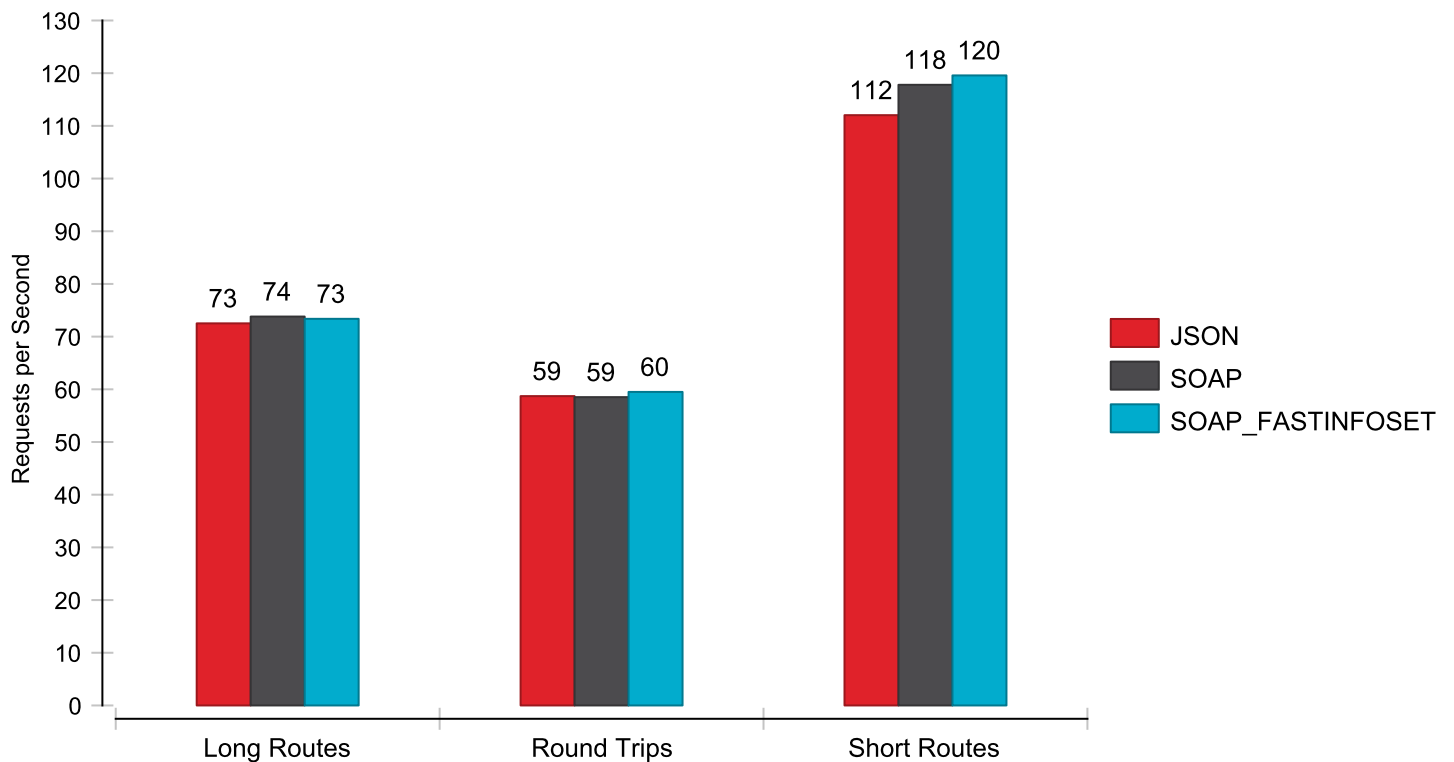**xRoute Throughput - Routing with Feature Layer**

xRoute Throughput - Routing with different Result List Options

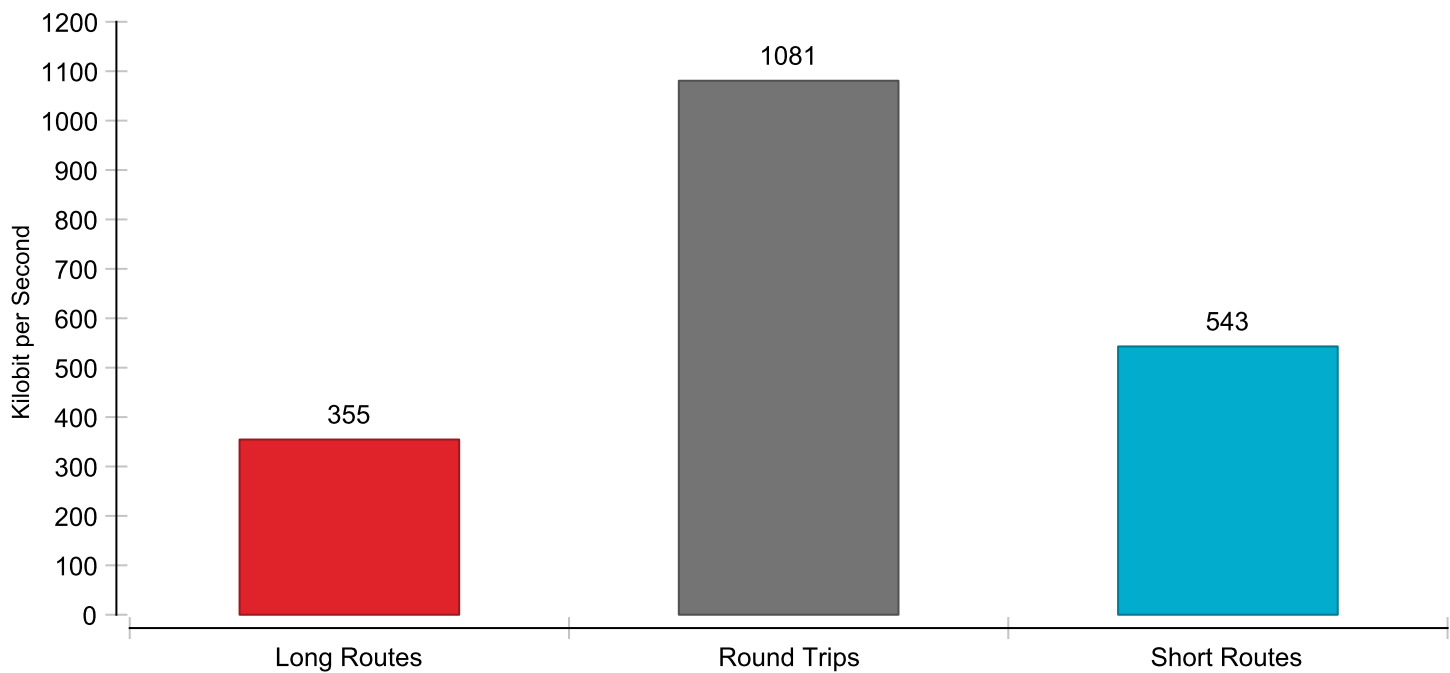**xRoute Throughput - Module Scaling**
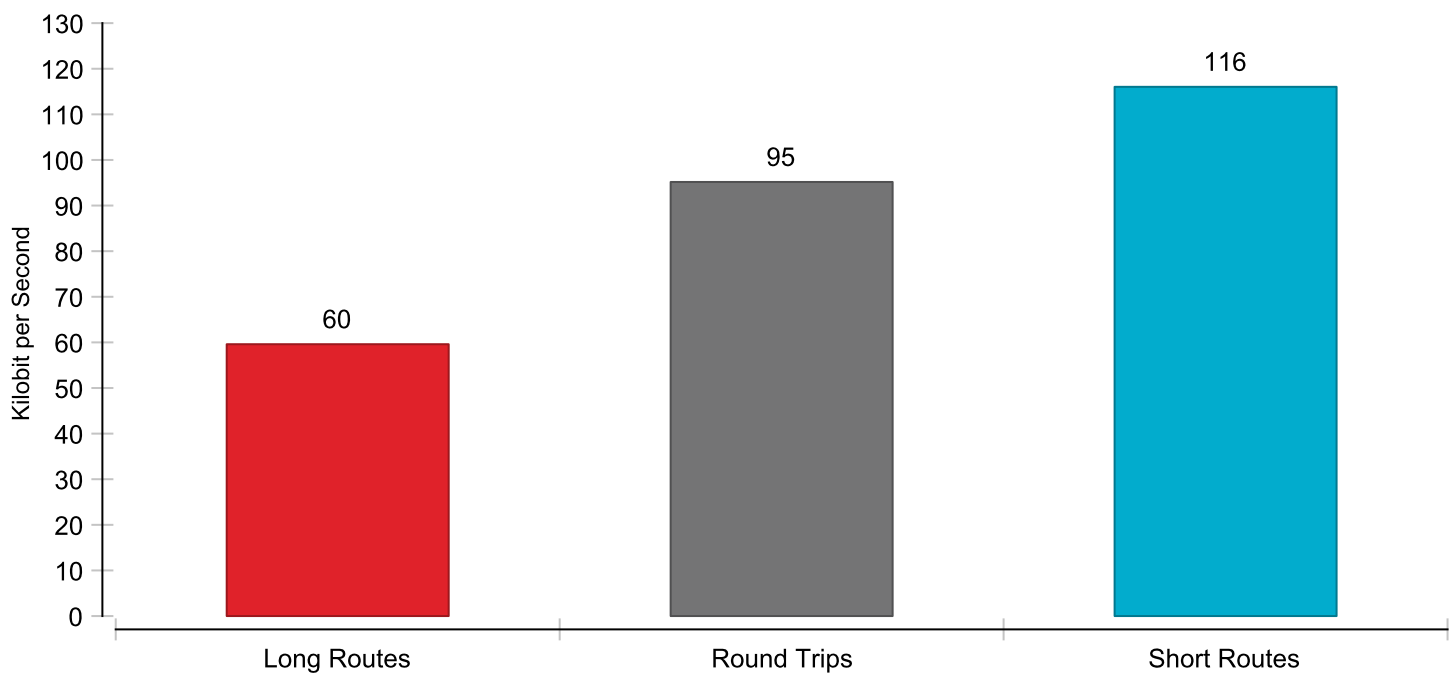

xRoute Throughput - Service Types

Bandwidth

The bandwidth section shows the bit-rate that is needed for different use cases. All bandwidth tests are measured using 50 clients and 12 service modules.
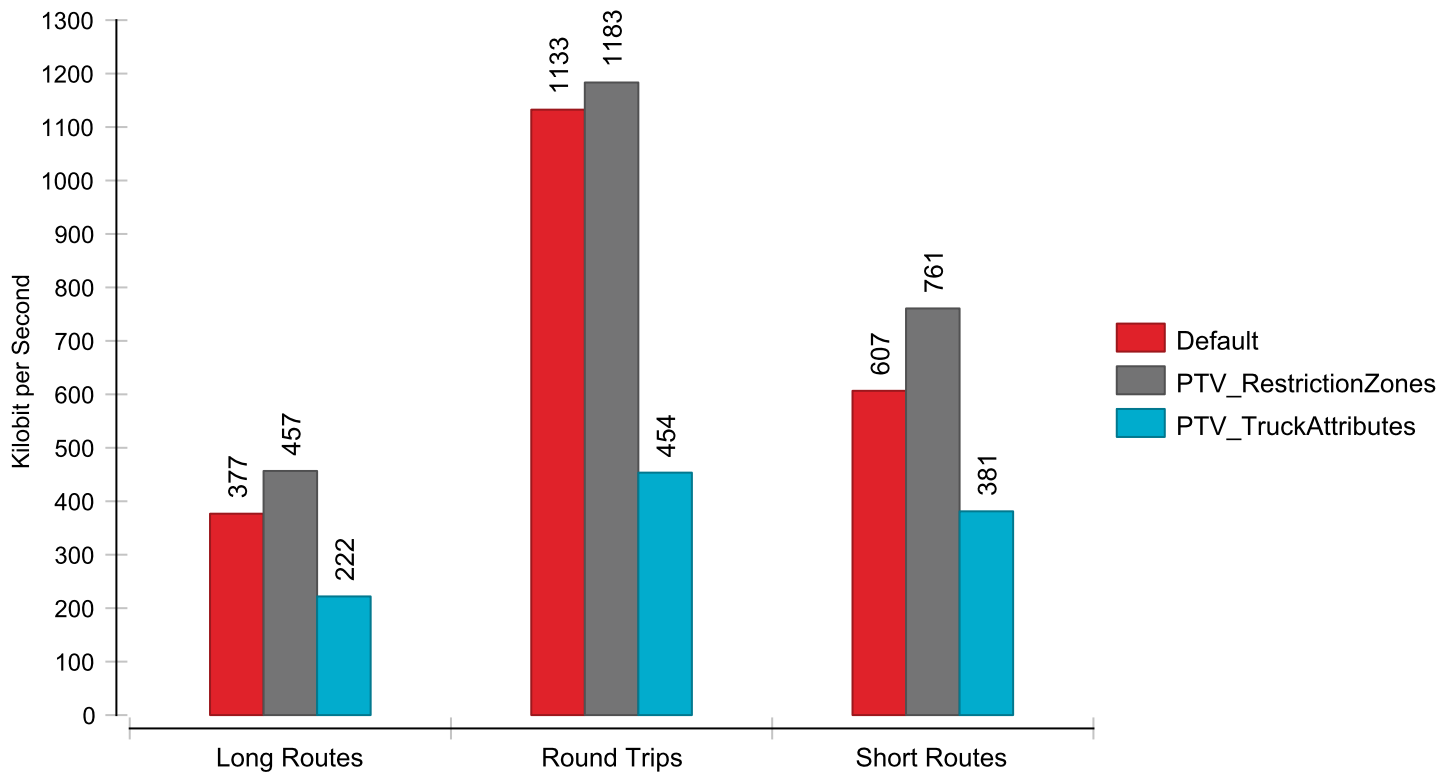
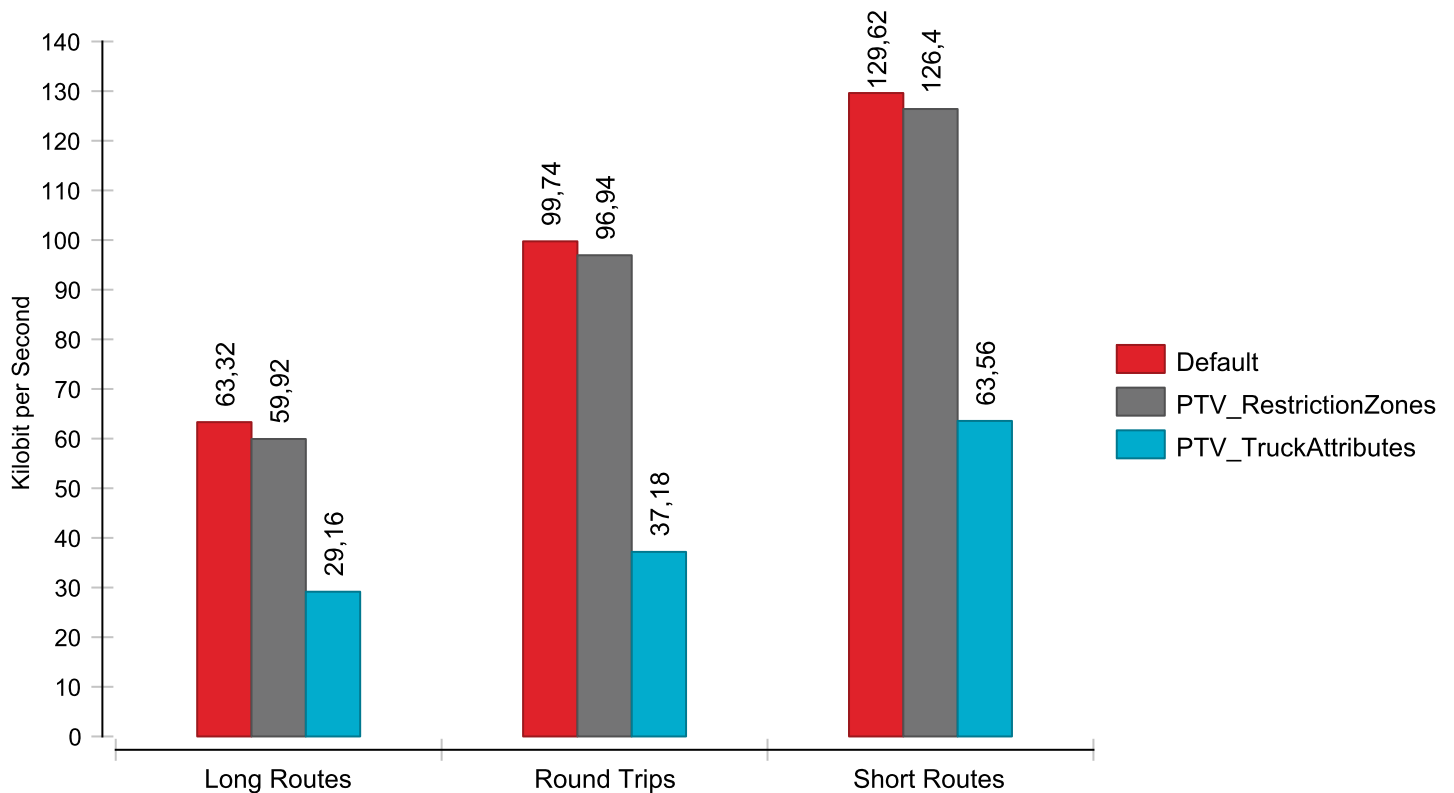**xRoute Request Bandwidth - Basic Routes**
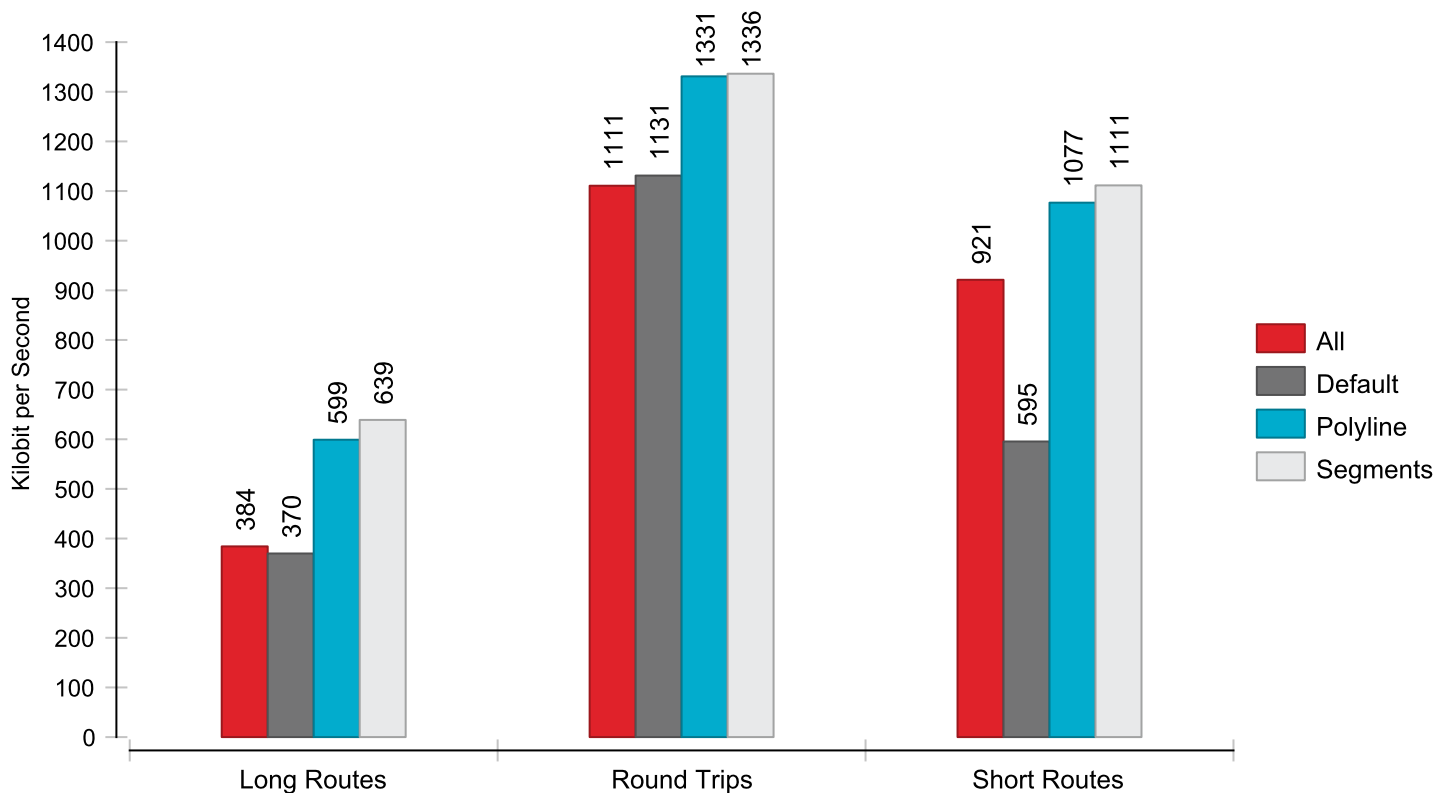

xRoute Response Bandwidth - Basic Routes

xRoute Request Bandwidth - Routing with Feature Layer Data

xRoute Response Bandwidth - Routing with Feature Layer Data

xRoute Request Bandwidth - Routing with different Result List Options

xRoute Response Bandwidth - Routing with different Result List Options