

4GBB, G.fast and beyond

Geographic decision support tool for handling
the complexity of 4GBB deployments

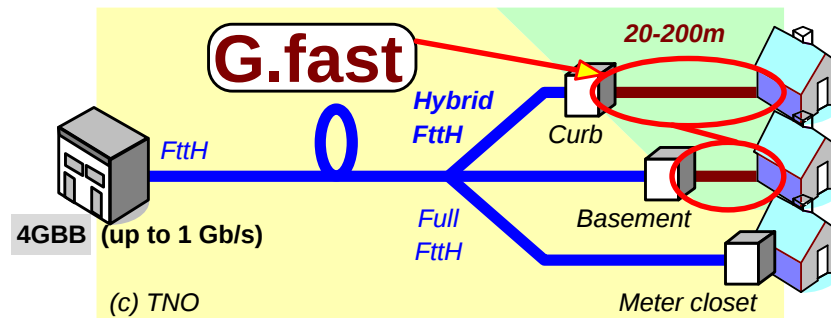
Rob F.M. van den Brink – TNO

 **TNO** innovation
for life

What is it about?

- 4GBB**
- Next Generation BroadBand
 - Service package requiring 100 Mb/s - 1 Gb/s

- G.fast**
- New option for Telcos to deliver 4GBB
 - Up to 1 Gb/s via copper
 - To reuse last 20-200m of telephony wiring
 - Under standardisation (ITU, BBF, ETSI, ..)



- Hybrid FttH**
- A special flavor of FttH
 - Combination of fiber & copper
 - Can save a lot of digging & installation time
 - Lower CAPEX than Full FttH



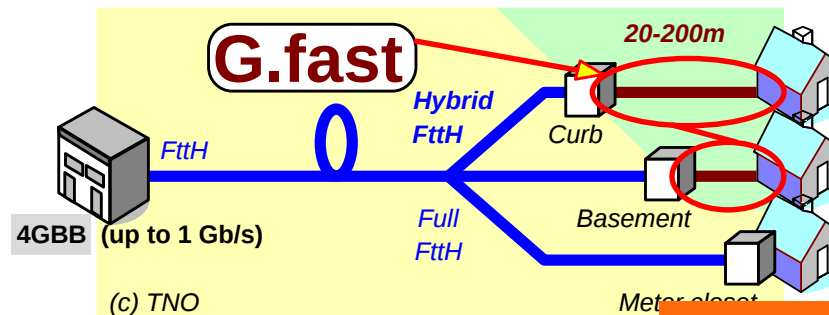
What is it about?

4GBB

- Next Generation BroadBand
- Service package requiring up to 1 Gb/s

G.fast

- New option for Telcos to deliver 4GBB
- Up to 1 Gb/s via copper
- To reuse last 20-200m of telephony wiring
- Under standardisation (ITU, BBF, ETSI, ..)



How much lower in CAPEX?



Hybrid FttH

- A special flavor of FttH
- Combination of fiber & copper
- Can save a lot of digging & installation time
- **Lower CAPEX than Full FttH**

Next presentation



In appreciation of the excellent work
the Celtic-Plus Core Group honours the Project

4GBB
everywhere

with the

Excellence
Award
2013

Congratulations

For the Celtic-Plus Core Group

Jacques Magen
Celtic-Plus Chairman

(Celtic-Plus)

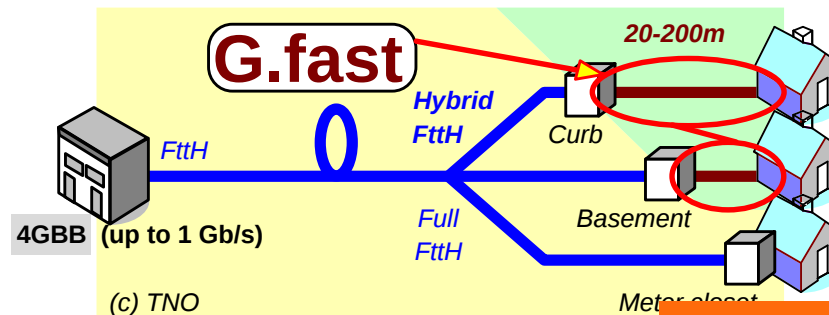
What is it about?

4GBB

- Next Generation BroadBand
- Service package requiring up to 1 Gb/s

G.fast

- New option for Telcos to deliver 4GBB
- Up to 1 Gb/s via copper
- To reuse last 20-200m of telephony wiring
- Under standardisation (ITU, BBF, ETSI, ..)



How much saving in digging?



Hybrid FttH

- A special flavor of FttH
- Combination of fiber & copper
- Can save a lot of digging & installation time
- Lower CAPEX than Full FttH

This presentation

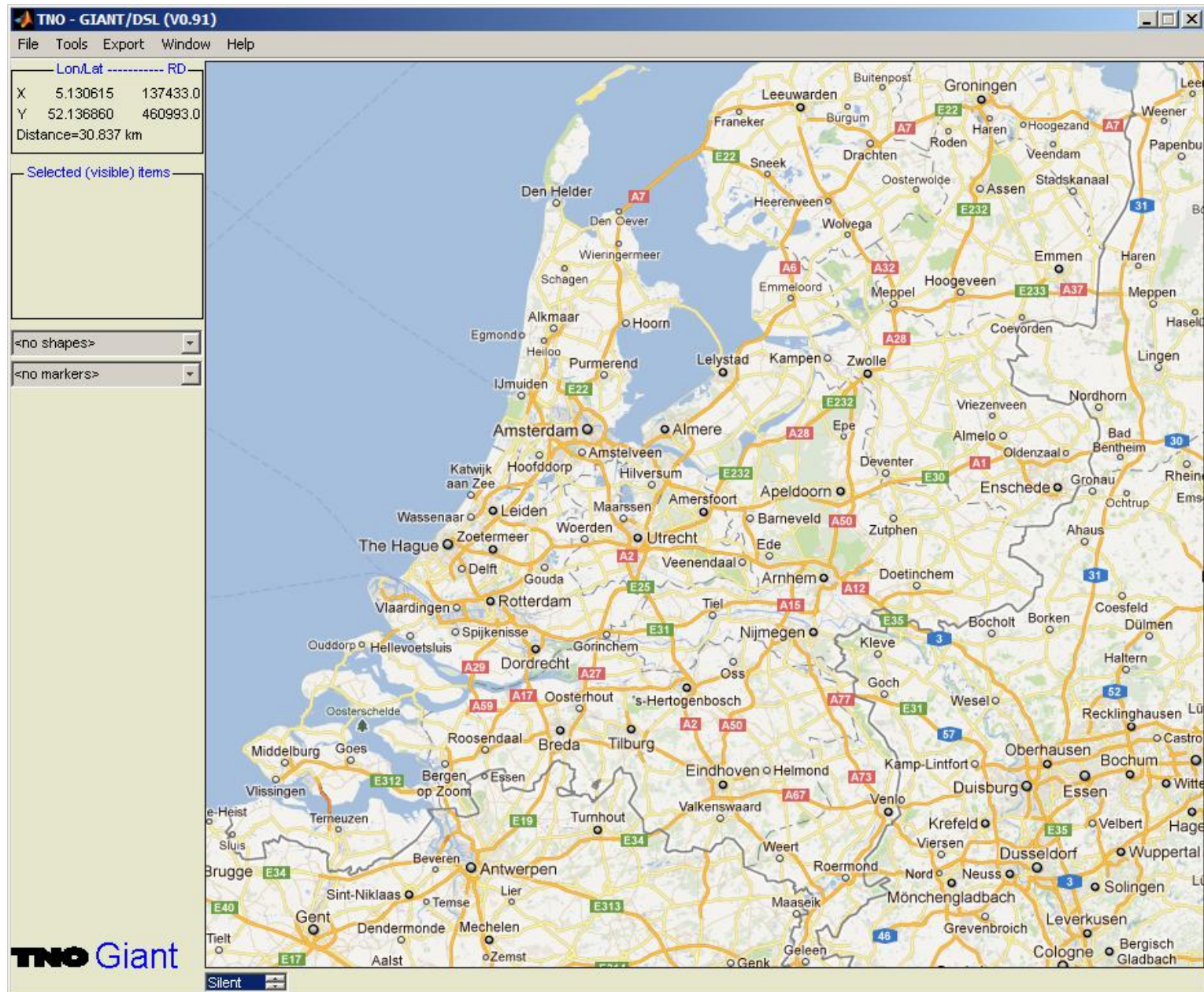


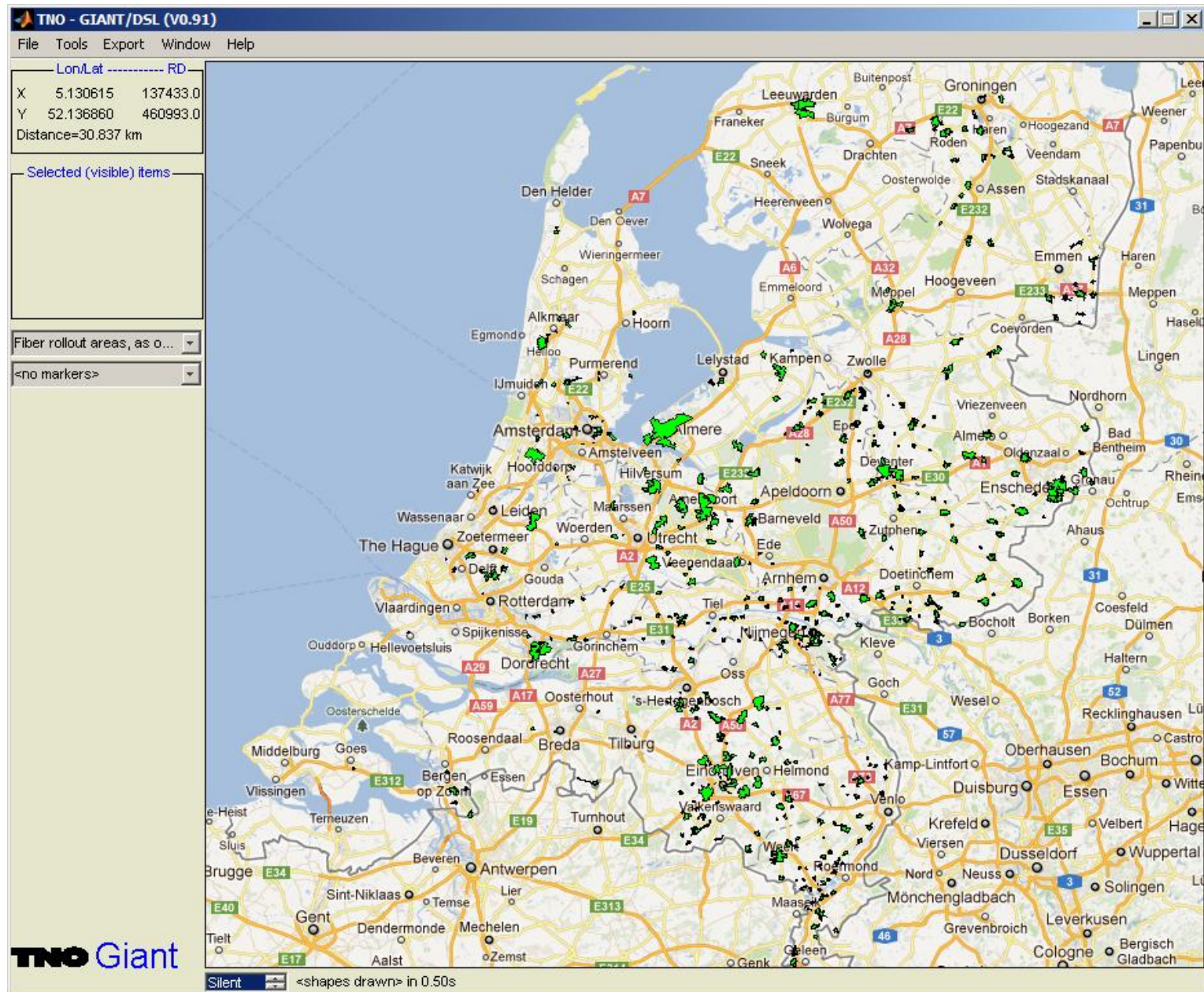
4GBB, G.fast and beyond

Geographic decision support tool for handling
the complexity of 4GBB deployments

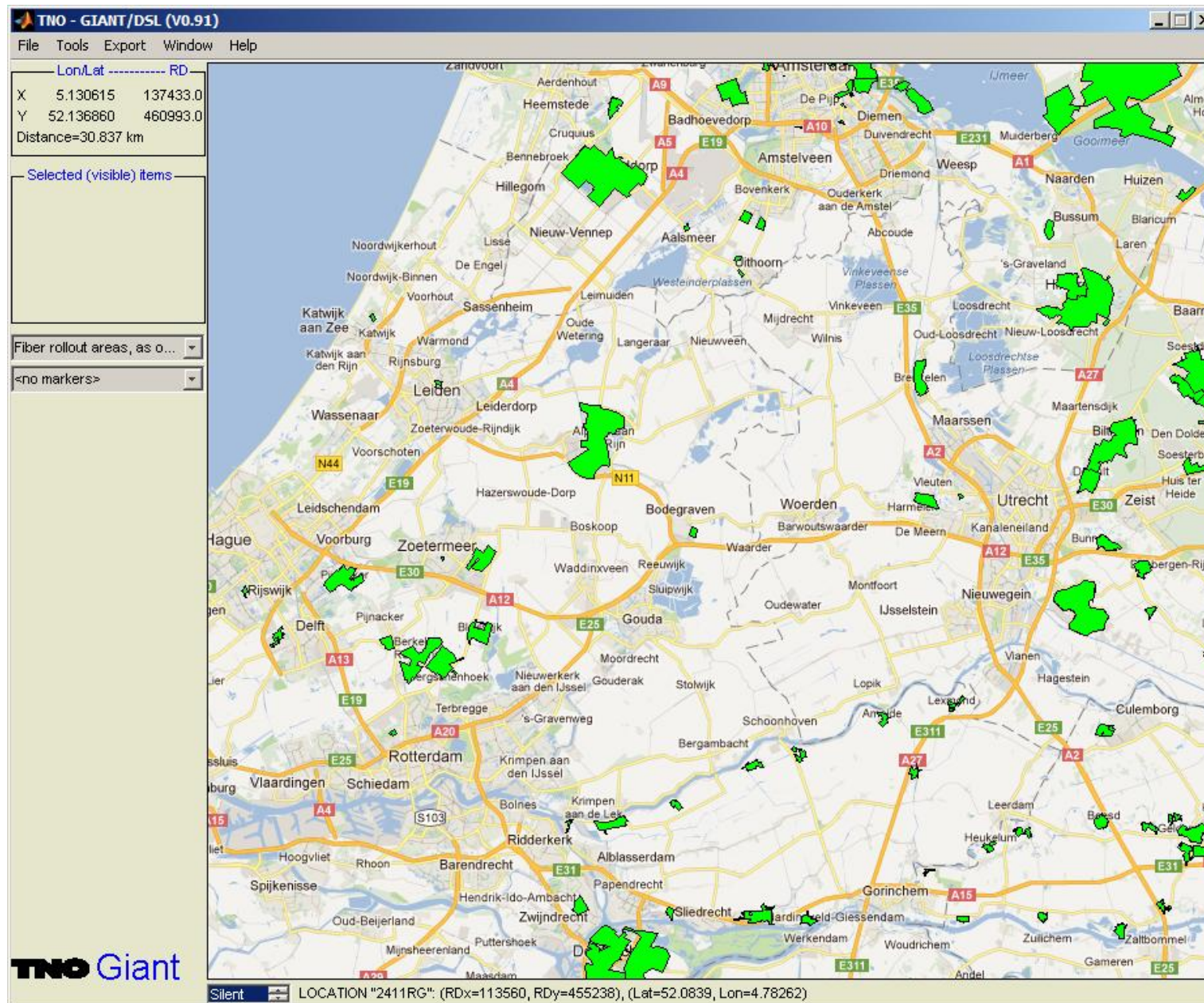
Rob F.M. van den Brink – TNO

TNO innovation
for life

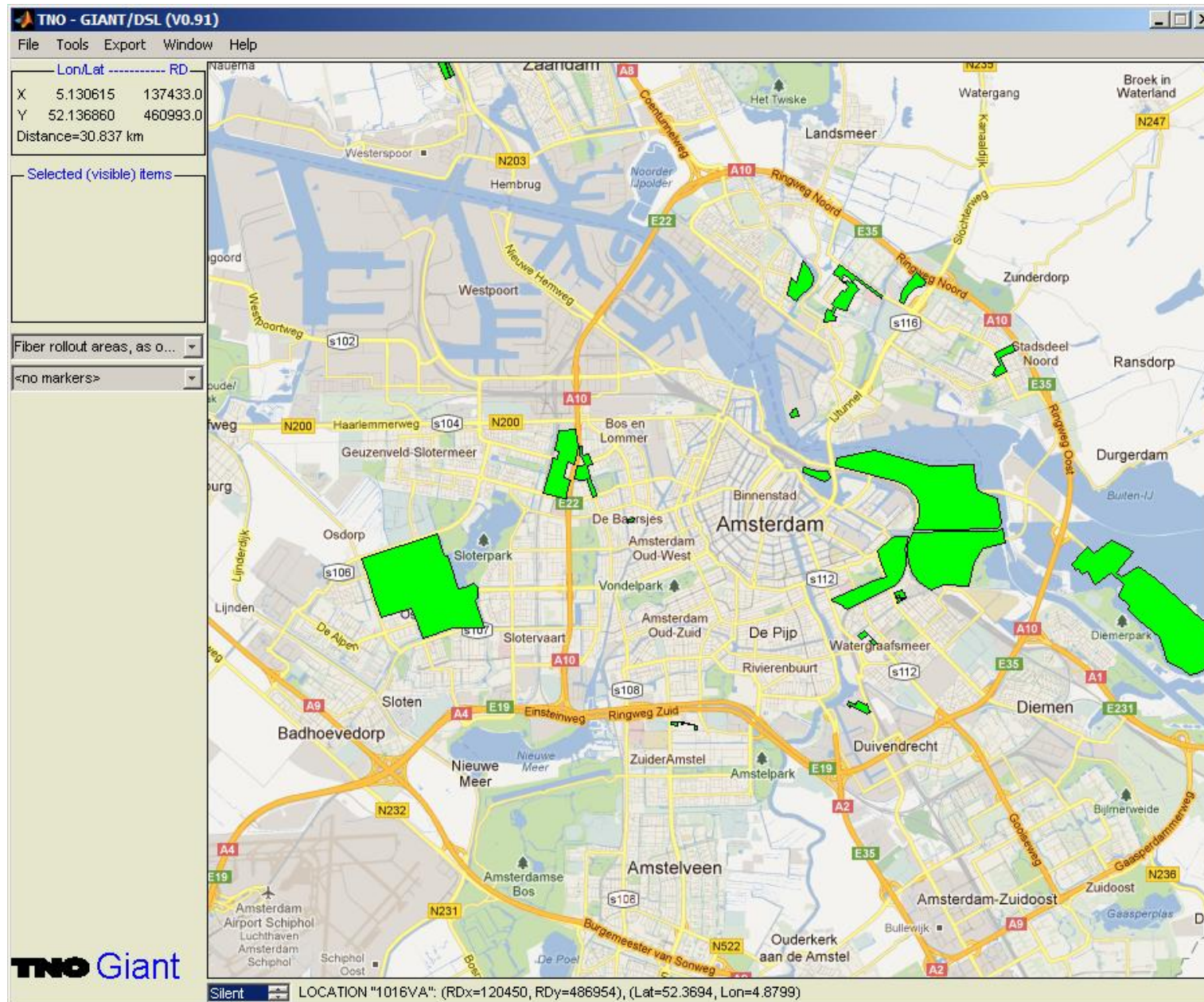




Fiber
deployments in
the Netherlands



Fiber
deployments in
the "Randstad"

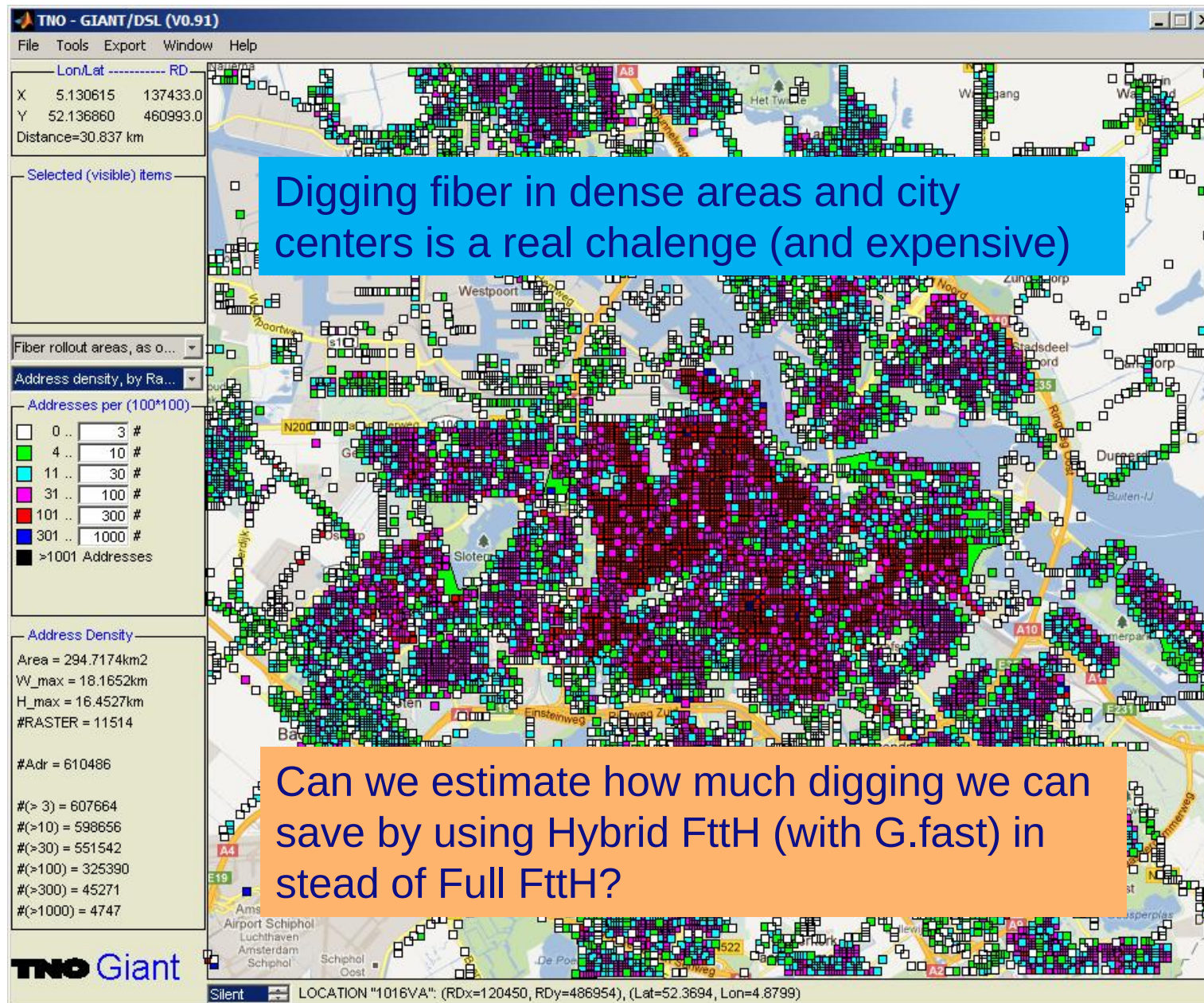


Fiber
deployments
around
Amsterdam

Dense areas
and city center
are still to be
done



Digging fiber in city centers is a real challenge



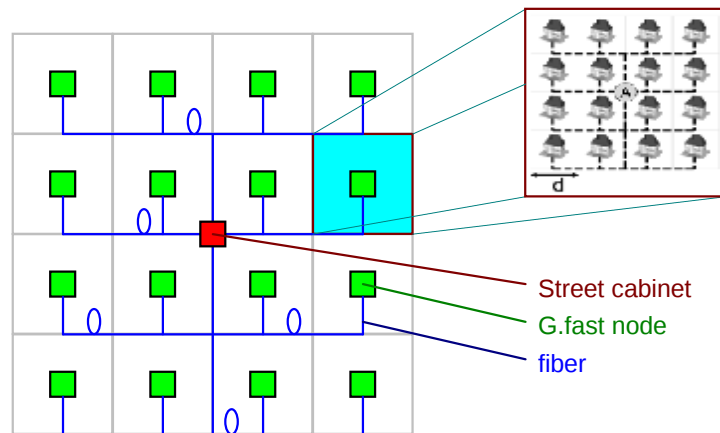
Digging fiber in dense areas and city centers is a real challenge (and expensive)

Fiber deployments around Amsterdam

Digging fiber in city centers is a real challenge

How much digging can we save with Hybrid FttH?

Lets try to predict this via a simple geometric deployment model

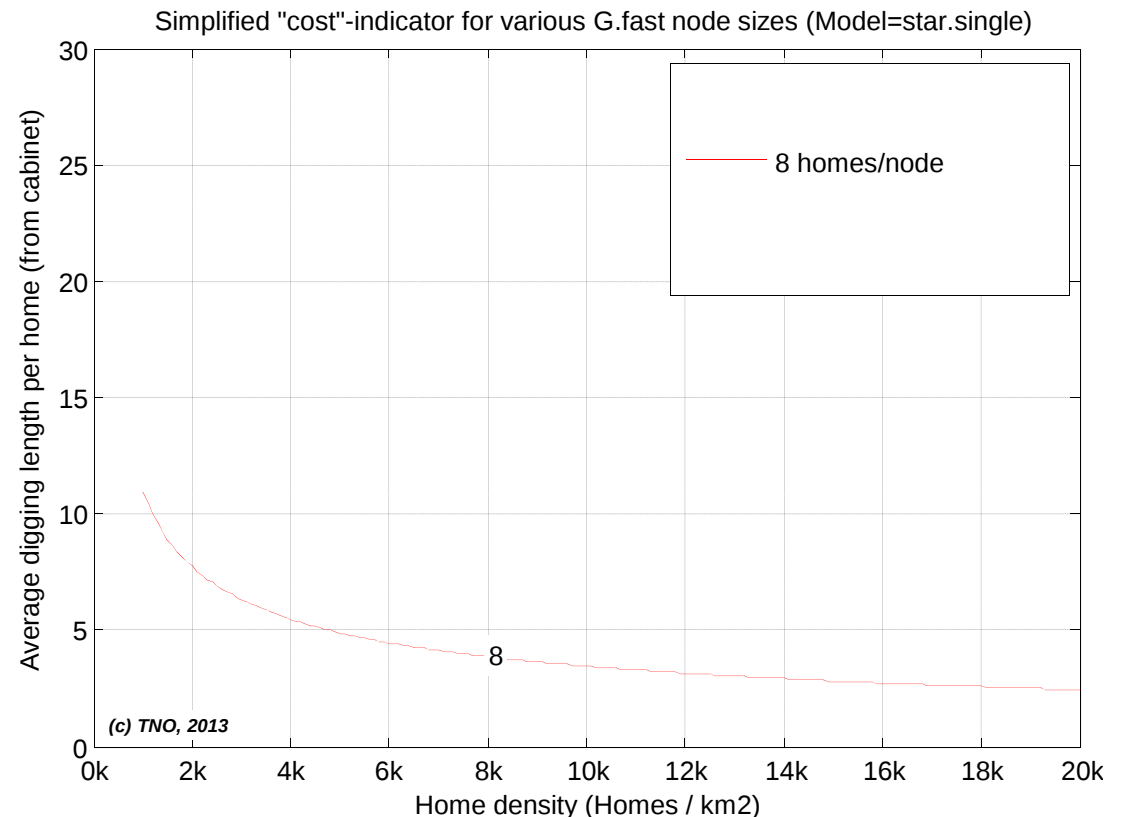


Assumptions:

- Homogeneous distributed
- n homes per G.fast node
- FttCab is already available

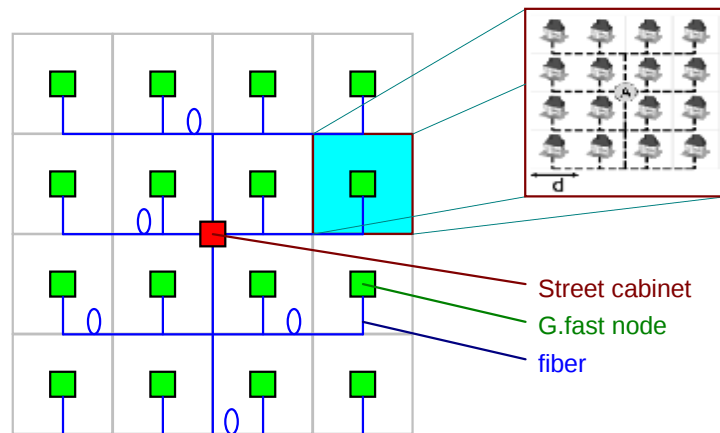
Questions:

- How many meters of fiber digging
- For different home densities
- For different G.fast node sizes



How much digging can we save with Hybrid FttH?

Lets try to predict this via a simple geometric deployment model

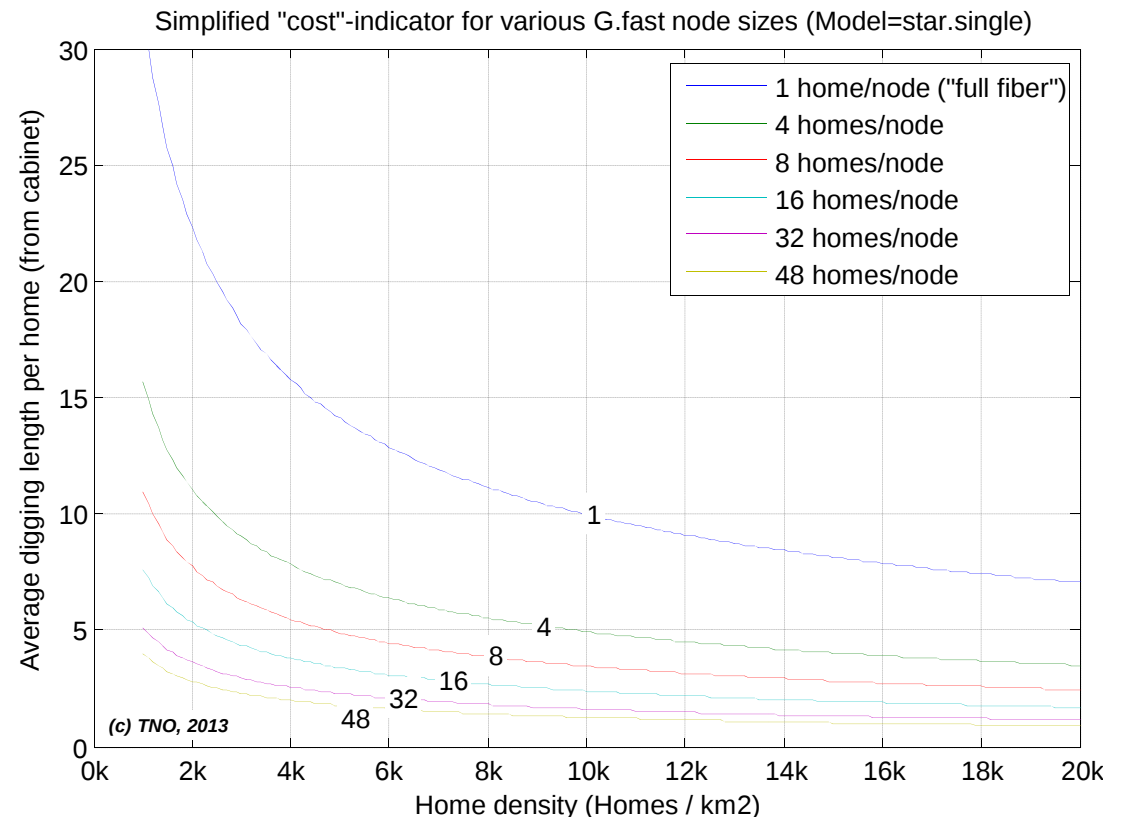


Assumptions:

- Homogeneous distributed
- n homes per G.fast node
- FttCab is already available

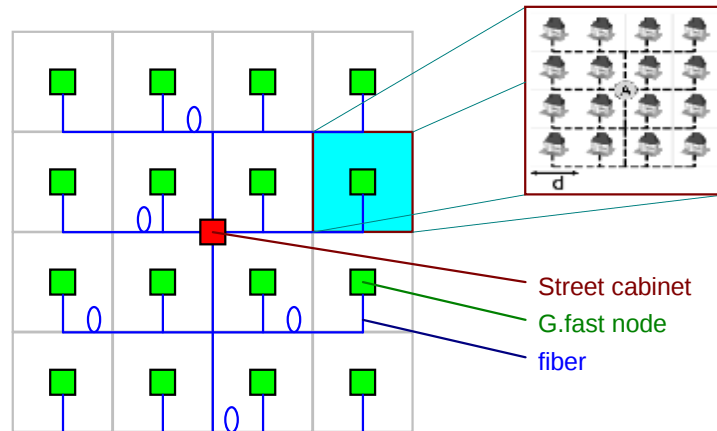
Questions:

- How many meters of fiber digging
- For different home densities
- For different G.fast node sizes



How much digging can we save with Hybrid FttH?

Lets try to predict via a simple geometric deployment model

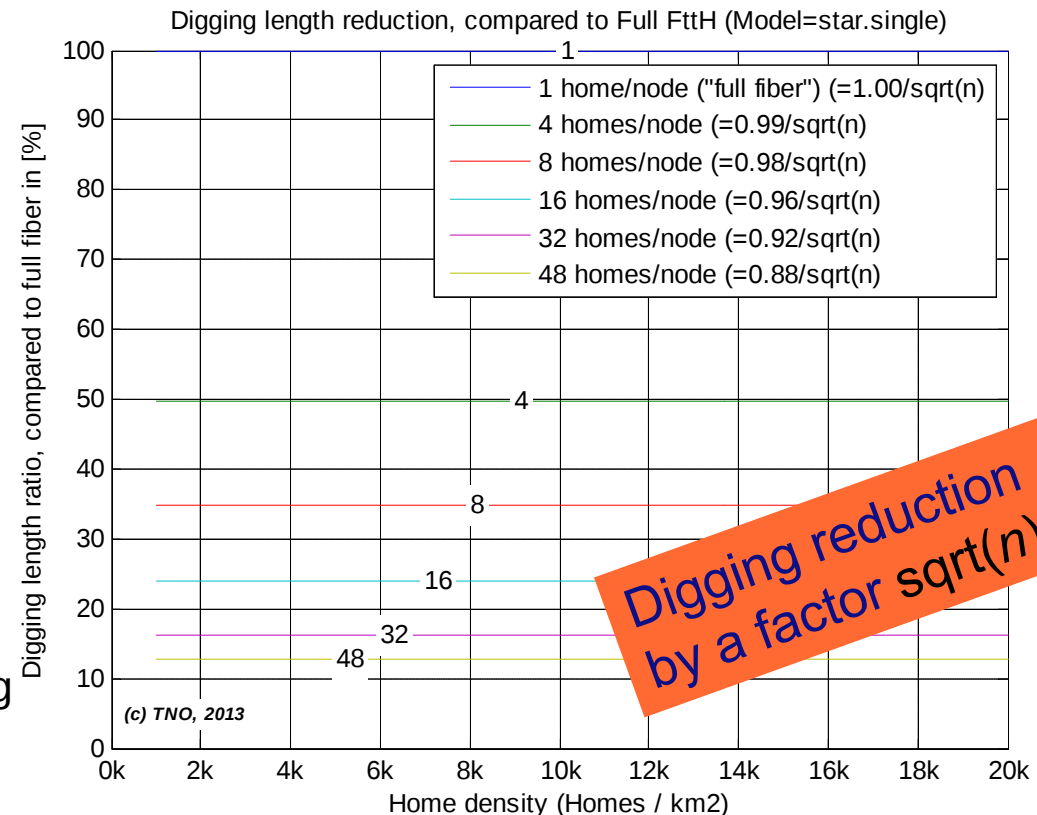


Assumptions:

- Homogeneous distributed
- n homes per G.fast node
- FttCab is already available

Question:

- How many meters of fiber digging
- For different home densities
- For different G.fast node sizes



How much digging can we save with Hybrid FttH?

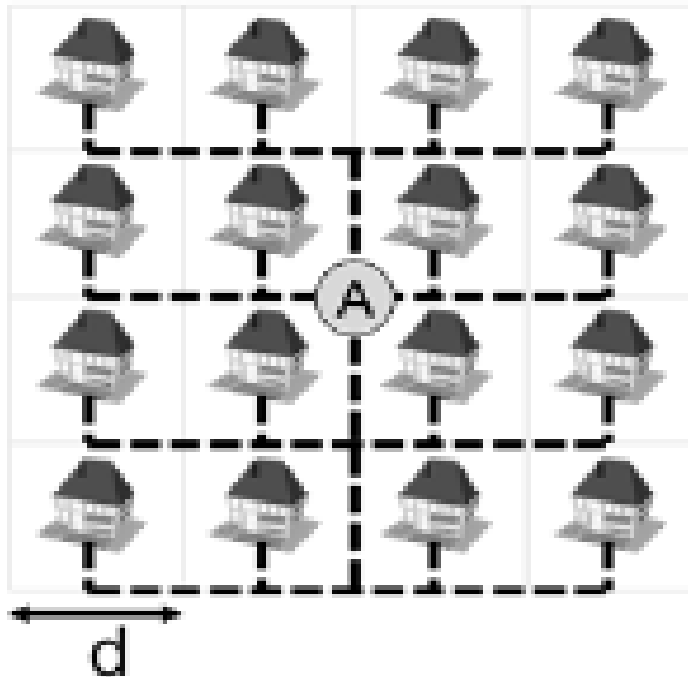
Lets try to predict via a simple geometric deployment model

Simple cost estimate, based on $\sqrt{n}$

	Cost / customer	Total costs customer
Full FttH	€ 200 (equipment) € 800 (digging)	€ 1000
Hybrid FttH, 16 homes G.fast node	€ 200 (equipment) € 800/4 (digging)	€ 400
Hybrid FttH, 64 homes G.fast node	€ 200 (equipment) € 800/8 (digging)	€ 300

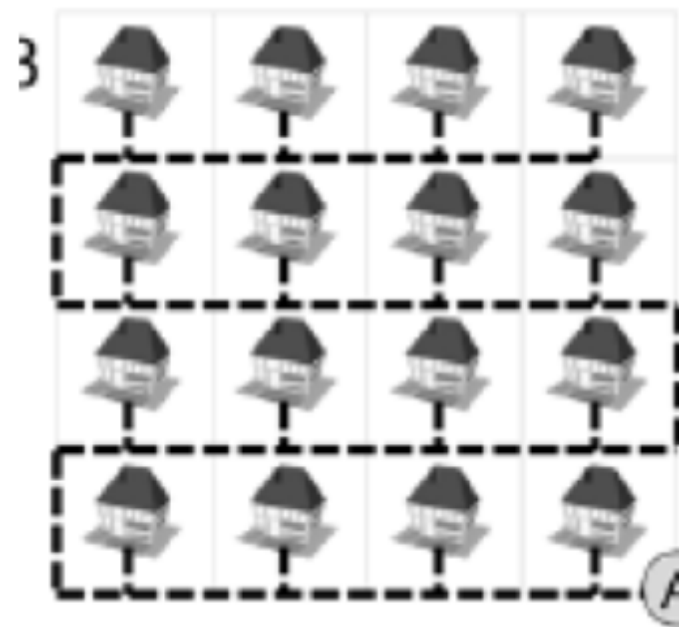
How much digging can we save with Hybrid FttH?

We cannot always apply large G.fast nodes



Single star topology

Copper length
"always" <200m



Single snake topology

Copper length
often >> 200m

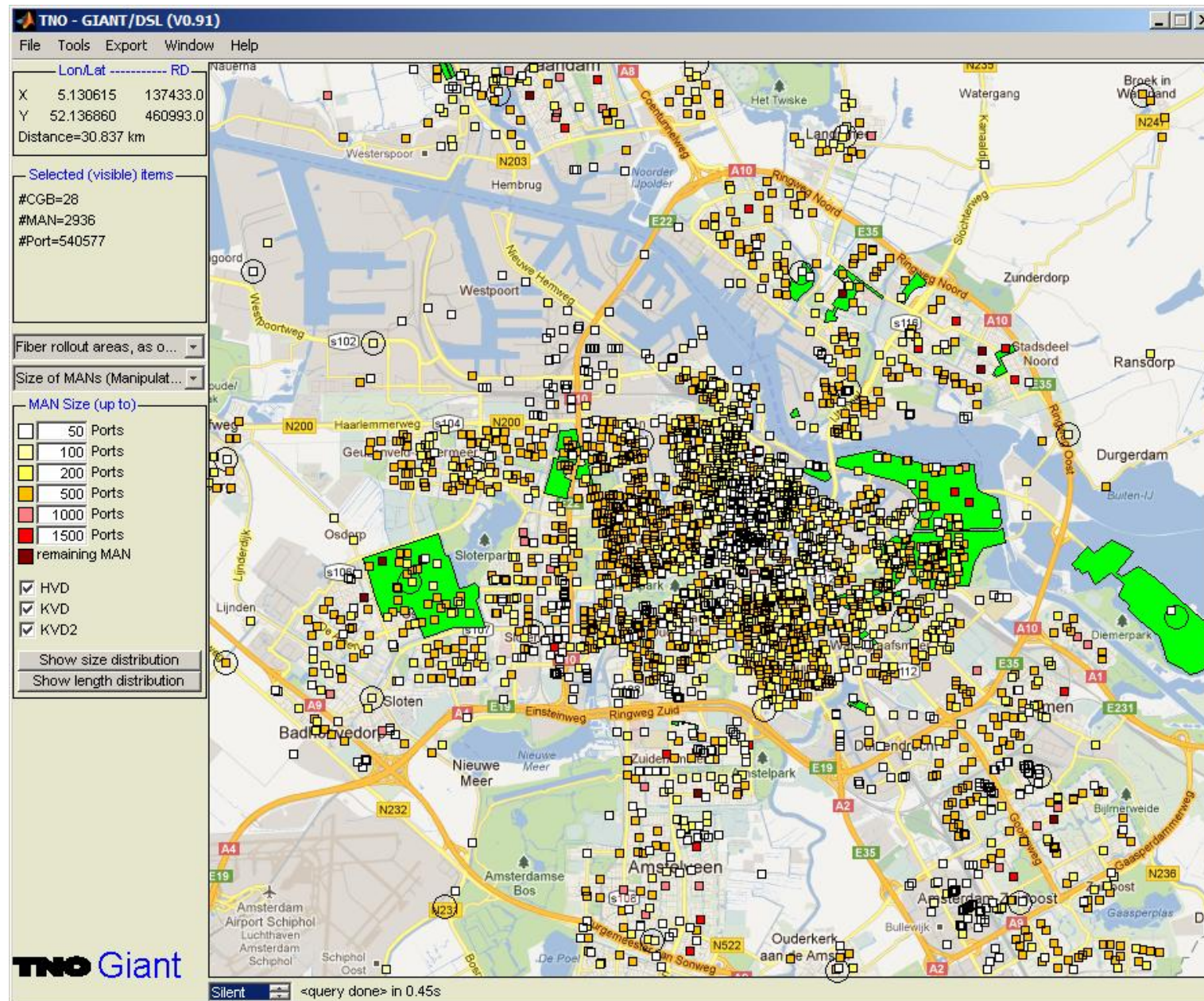
Can we do a more realistic analysis?

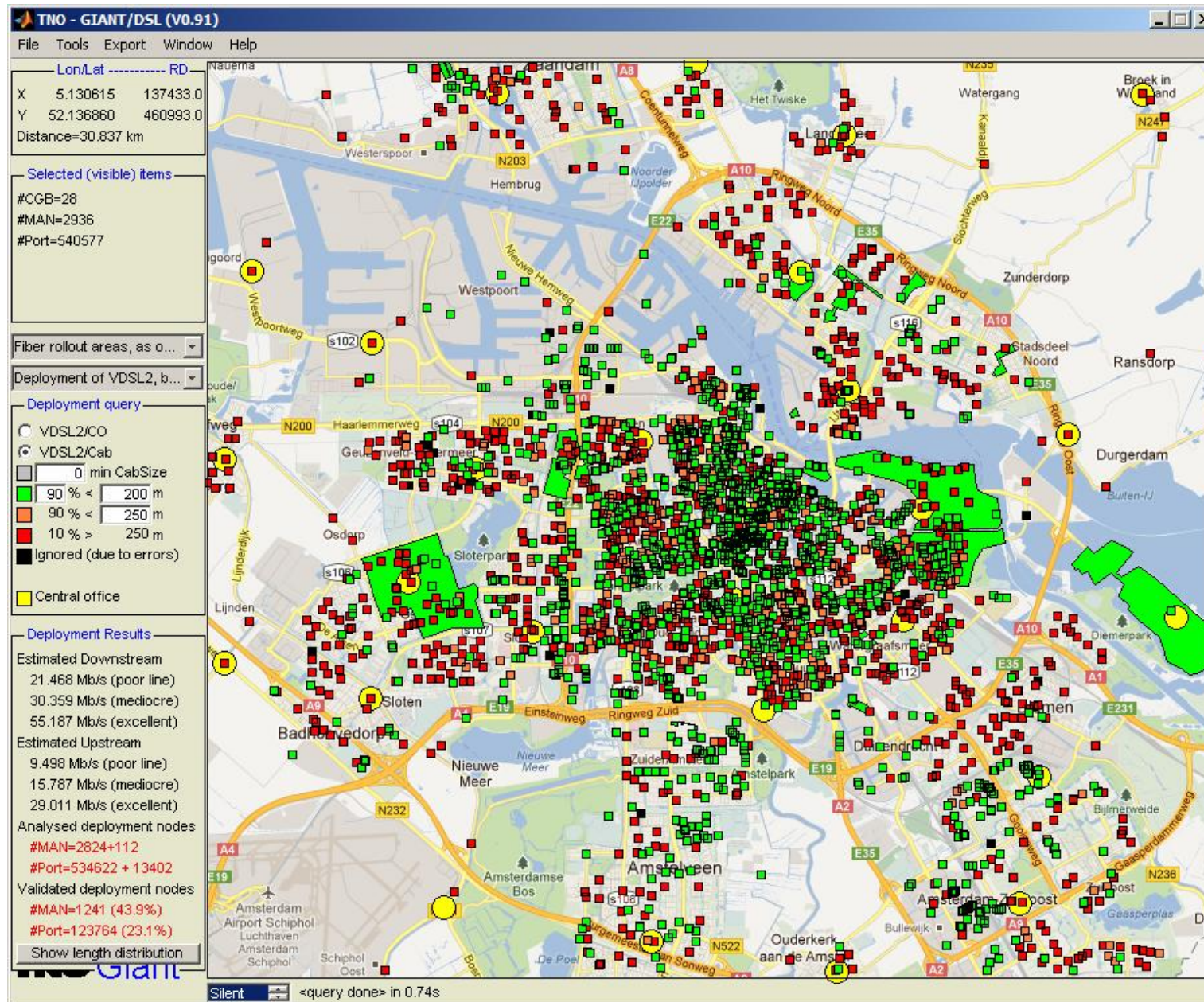
à Geographic decision support tool

With detailed knowledge on existing infrastructure



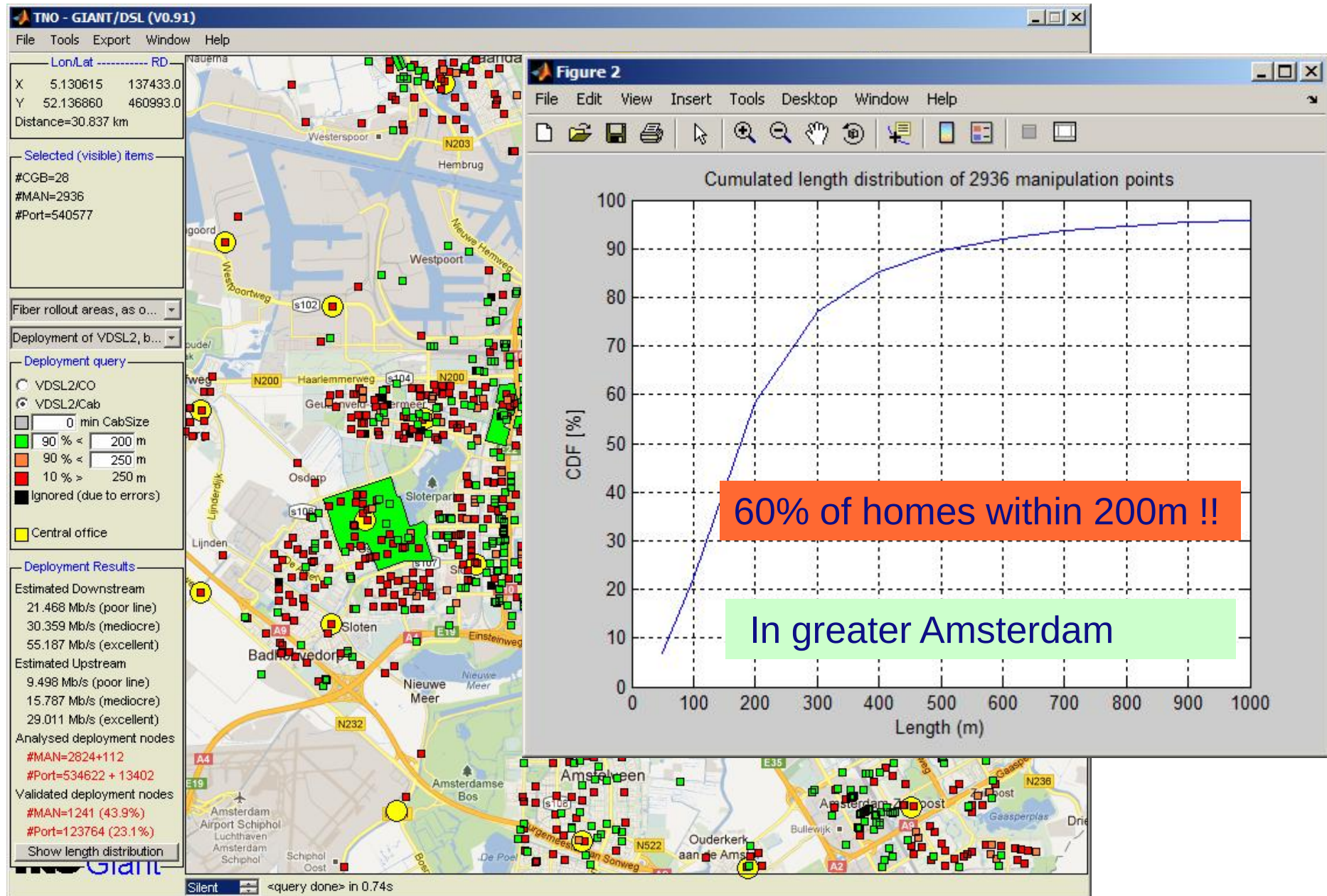
Several central
offices

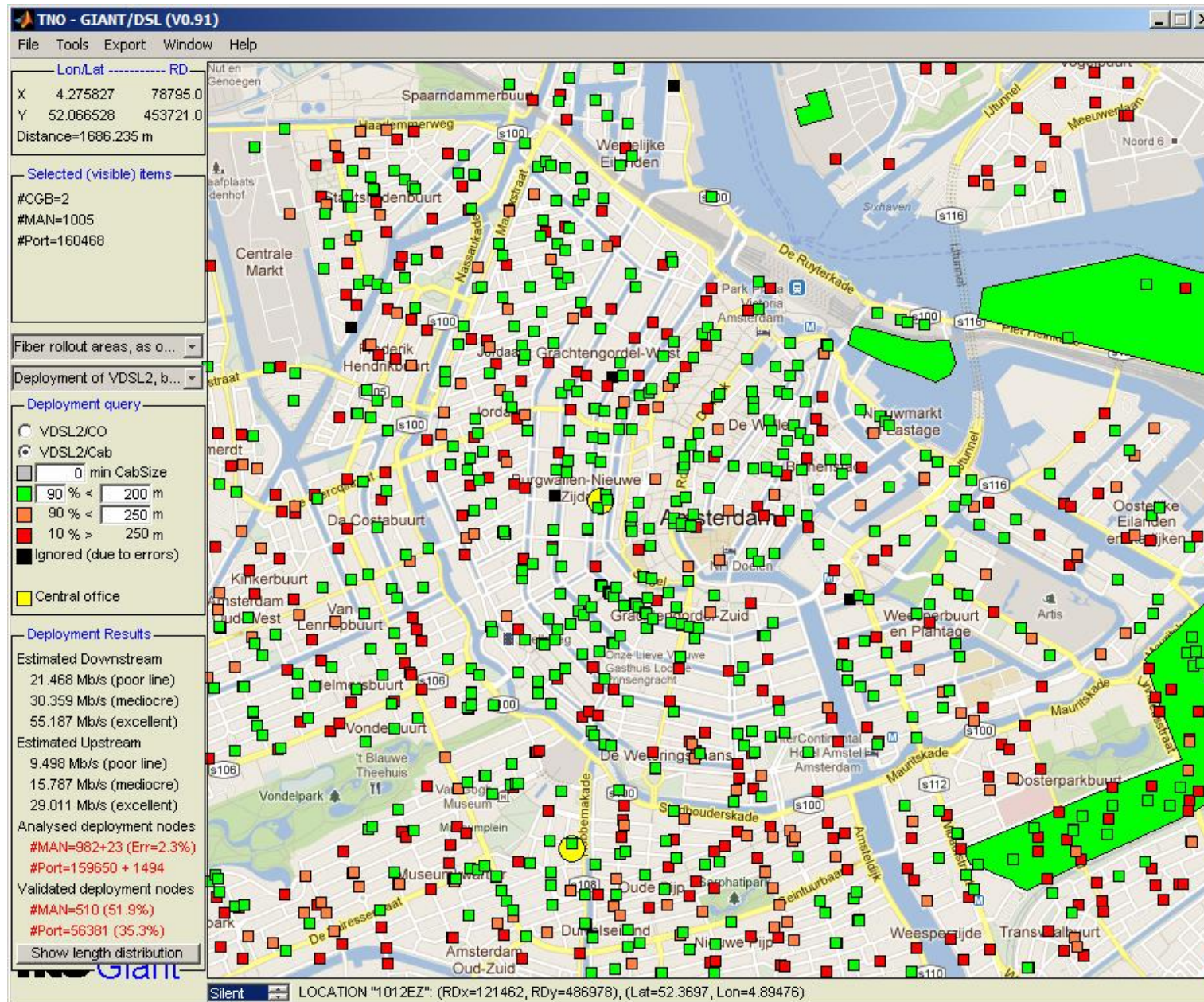




Let's study the
Geometry of the
copper
infrastructure

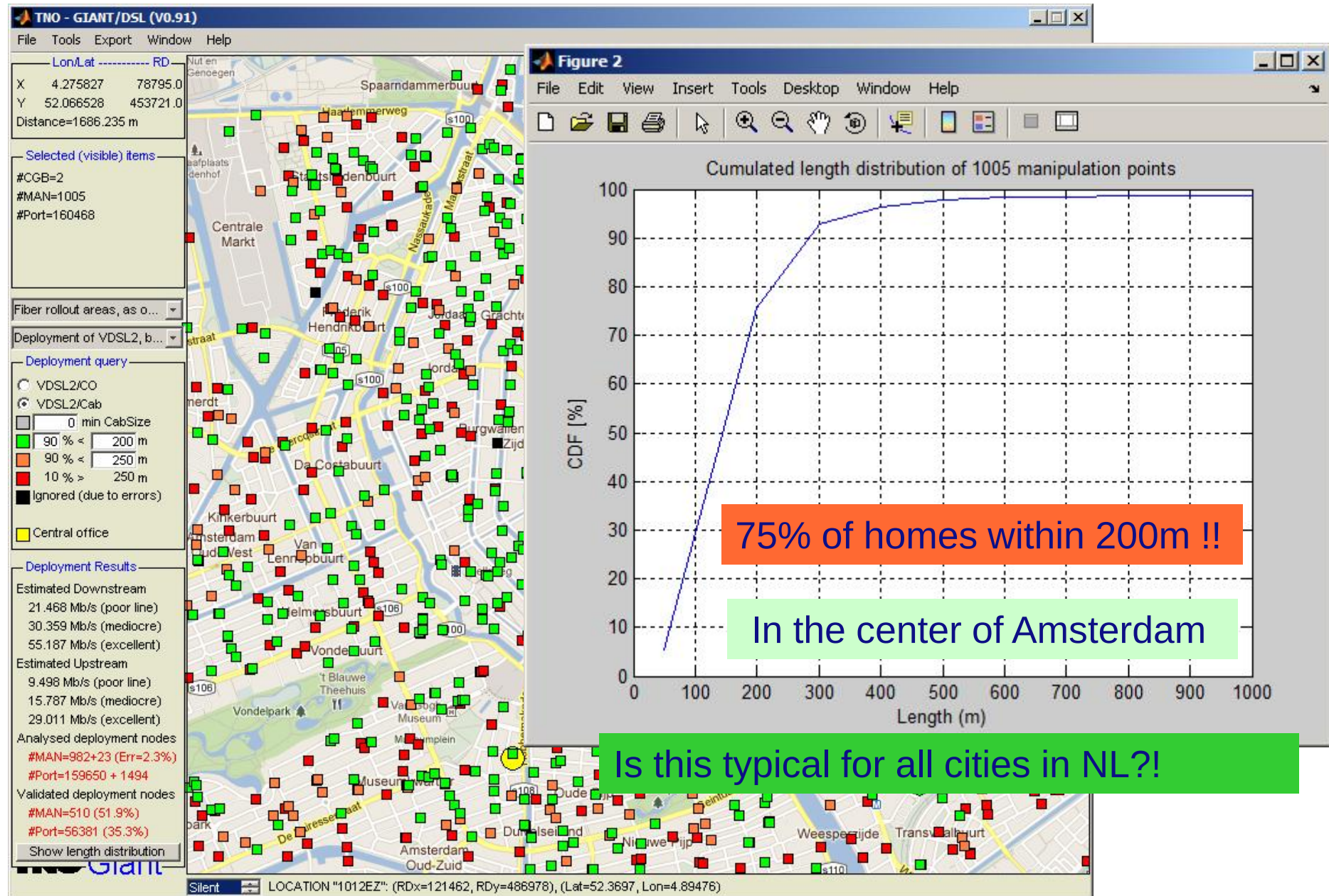
Several street
cabinets within
200m from
homes

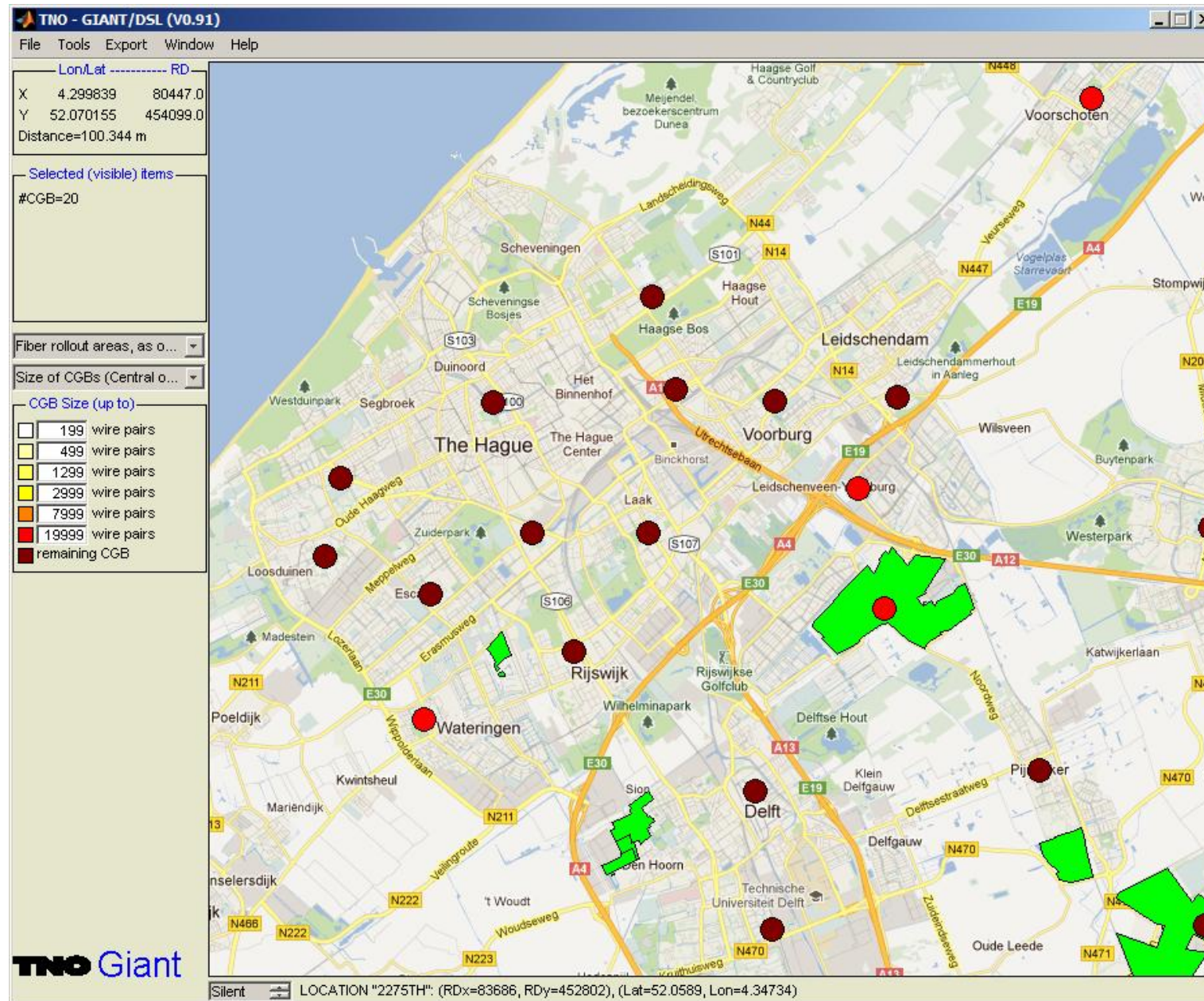




Let's focus on
the center of
Amsterdam

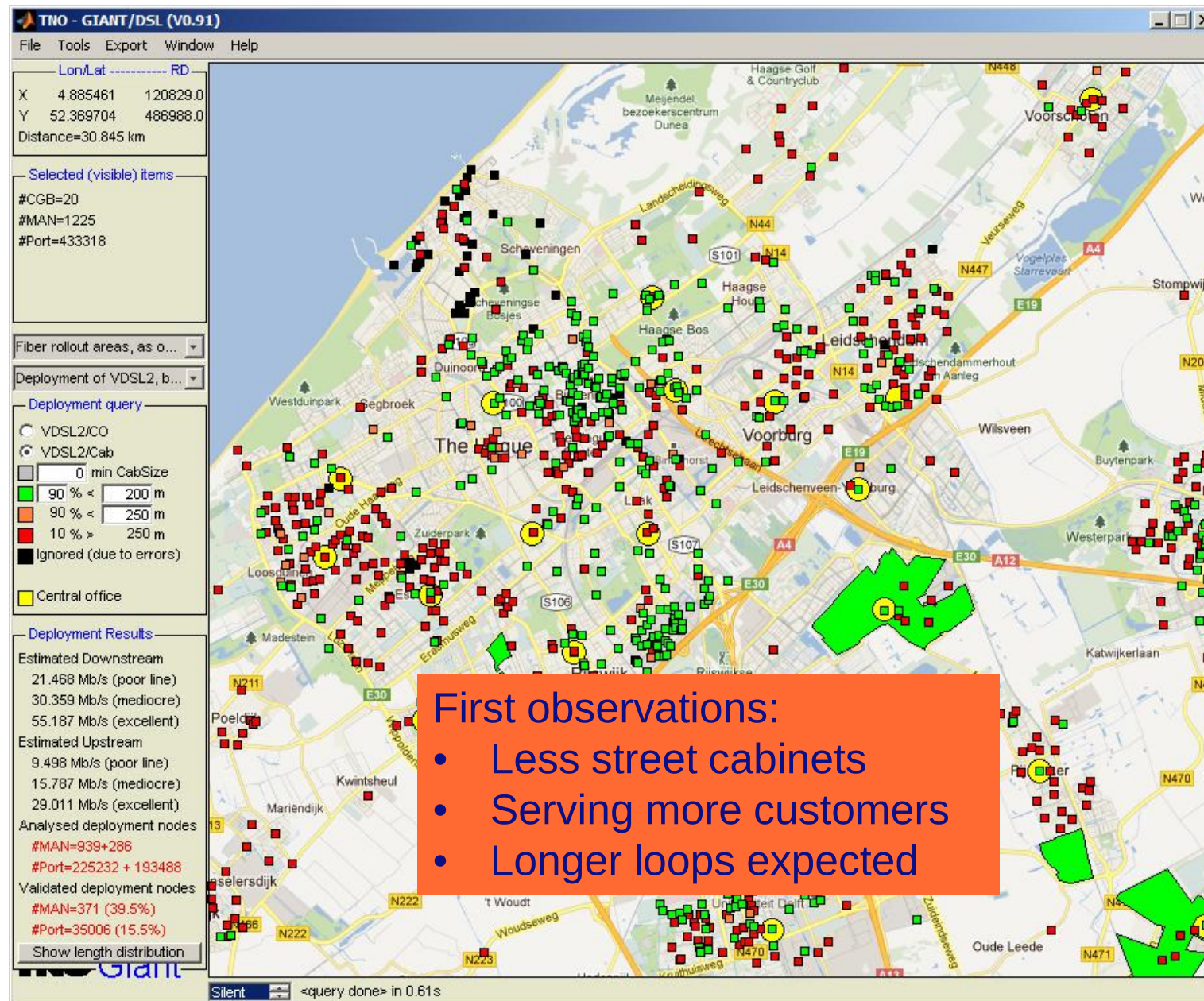
Most houses
are within
200m from
street cabinets





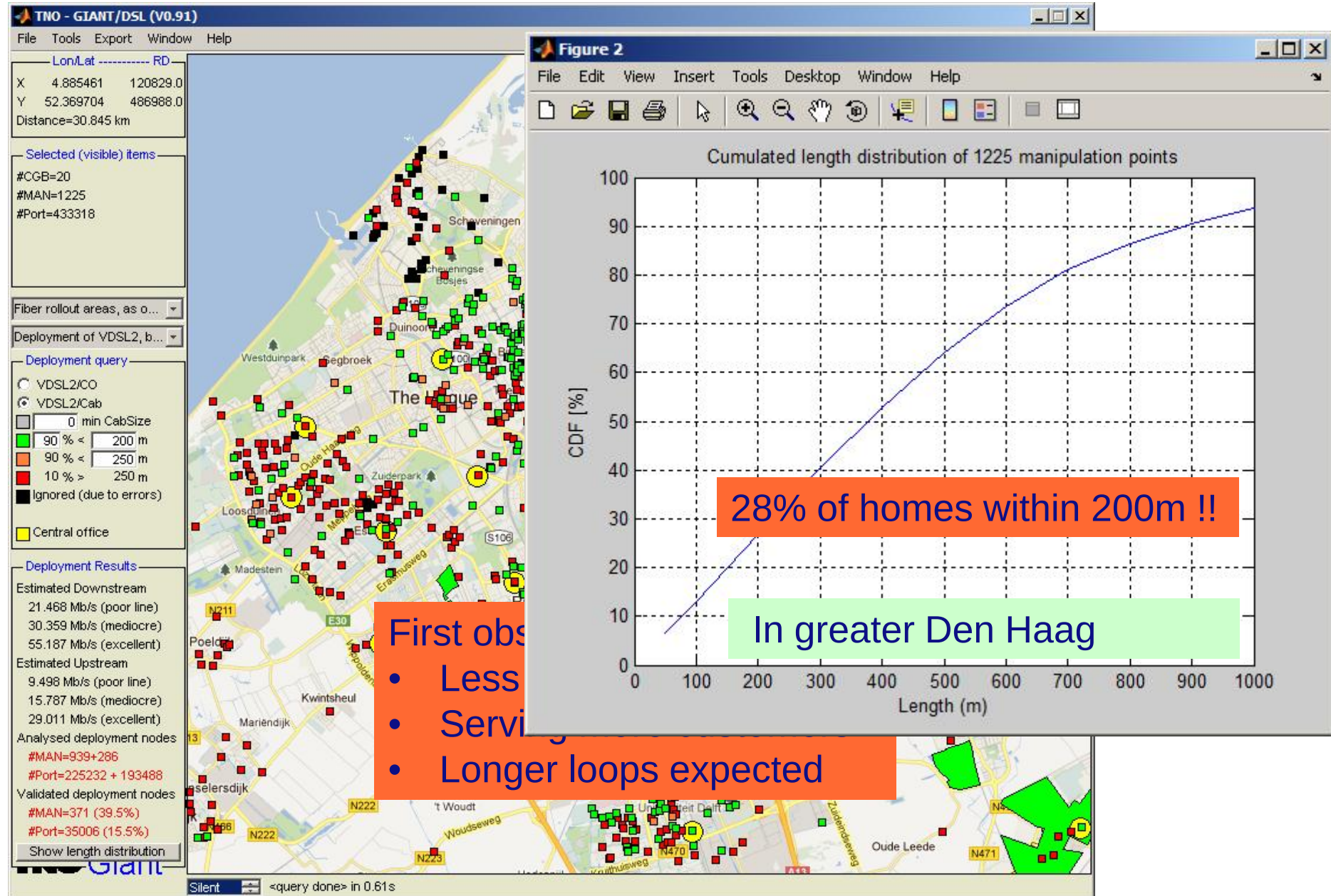
Fiber
deployments
around
Den Haag

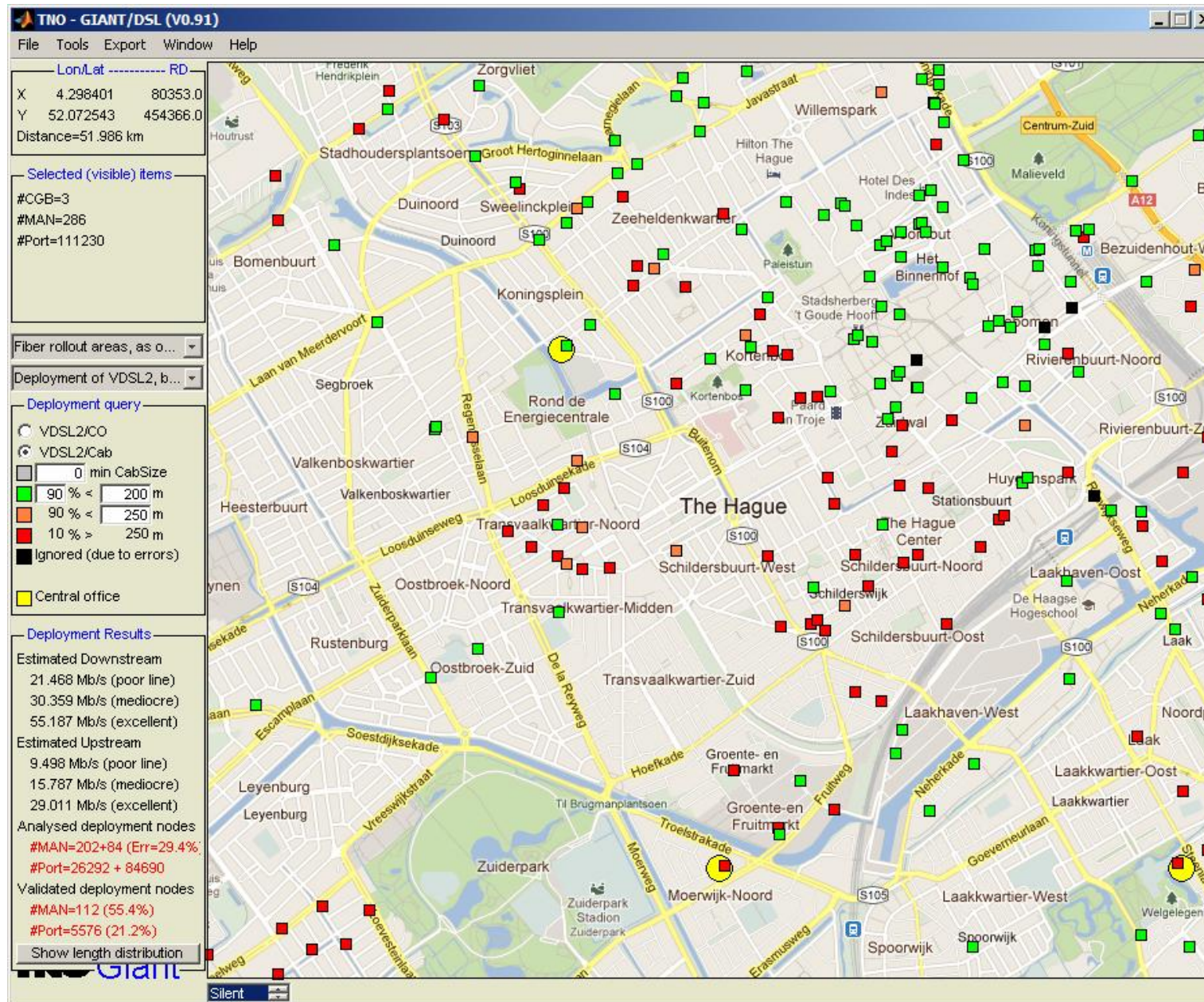
Also several
central offices



Fiber
deployments
around
Den Haag

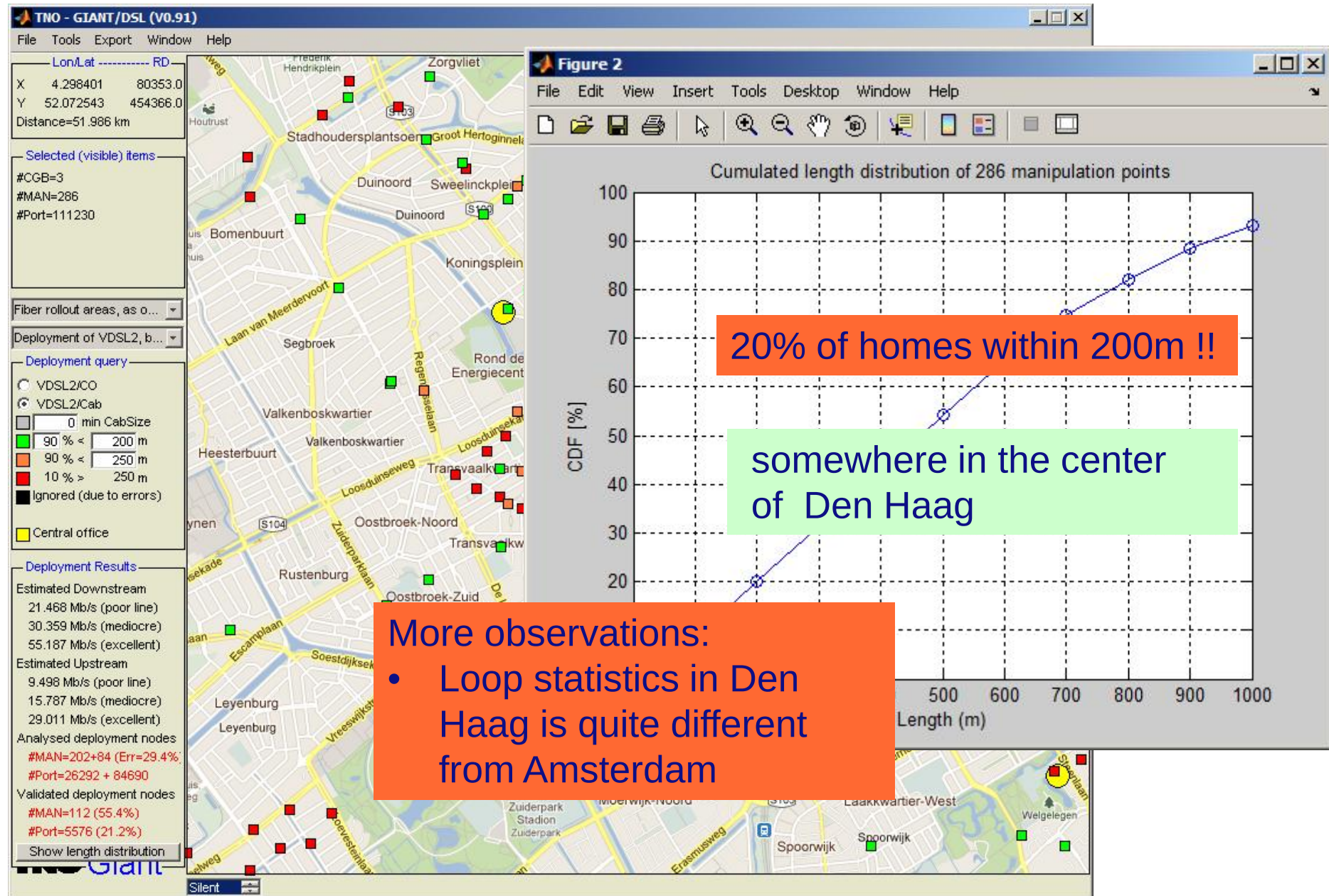
Several street
cabinets within
200m from
homes





Let's focus on
the center of
Den Haag

Street cabinets
are not so
dense as in
Amsterdam

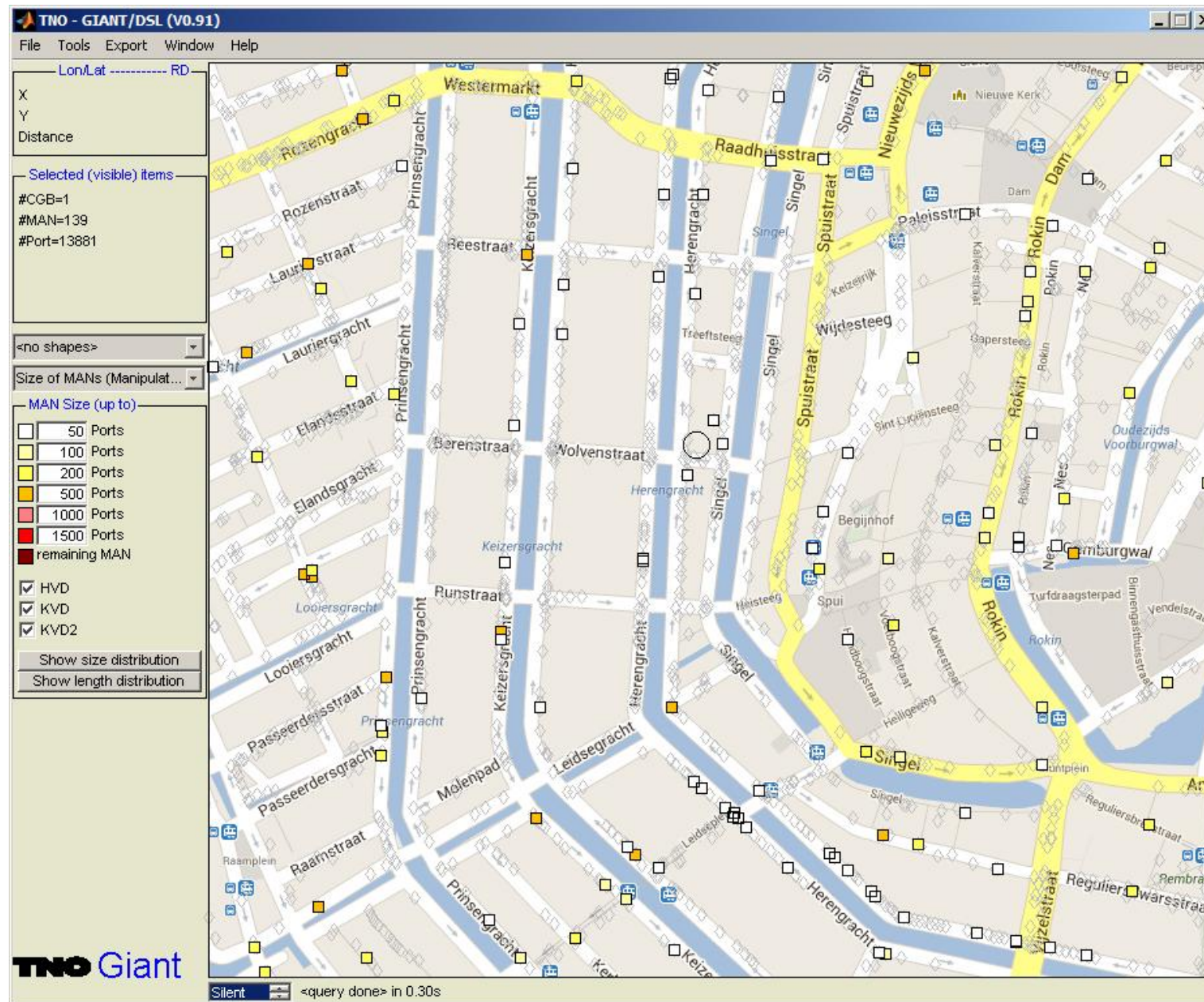


How to achieve

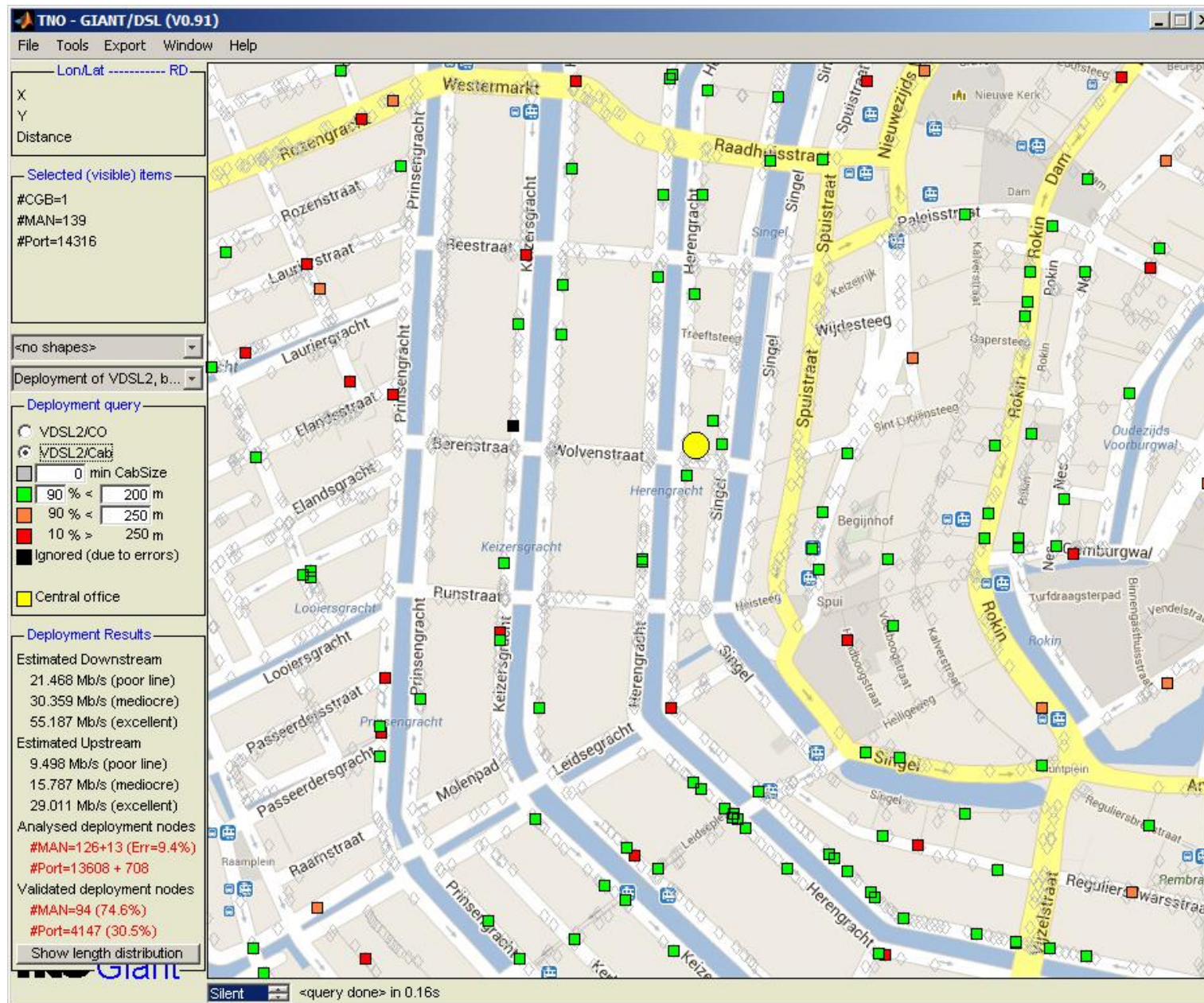
- 100% within “X” m copper distance
- At minimal total CAPEX for that constraint

By deploying G.fast closer to end-users

- Bringing fiber to new and well-selected locations
- At nodes within existing copper path (splices)
- To be found with an advanced activation algorithm
- To be analyzed with a geographic *decision support tool*

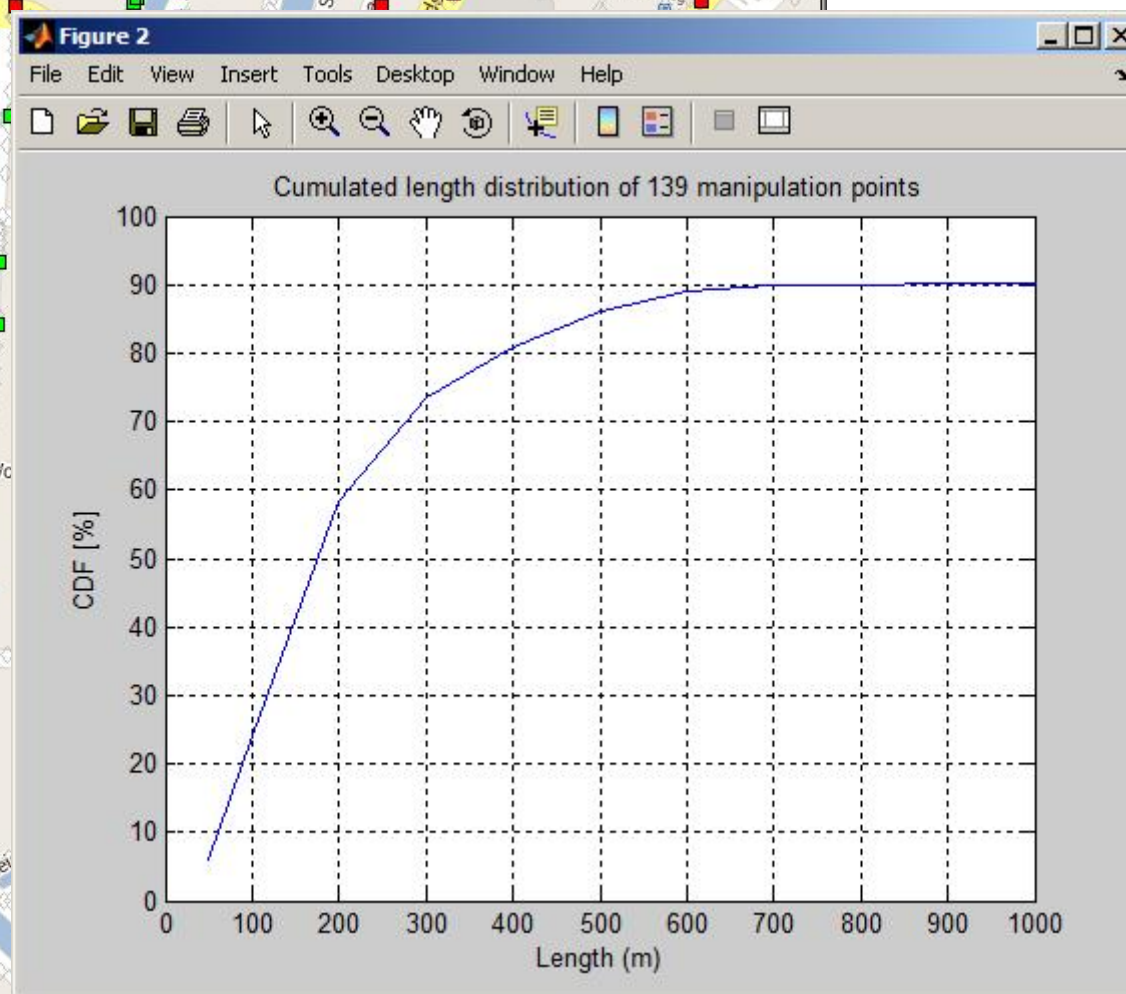
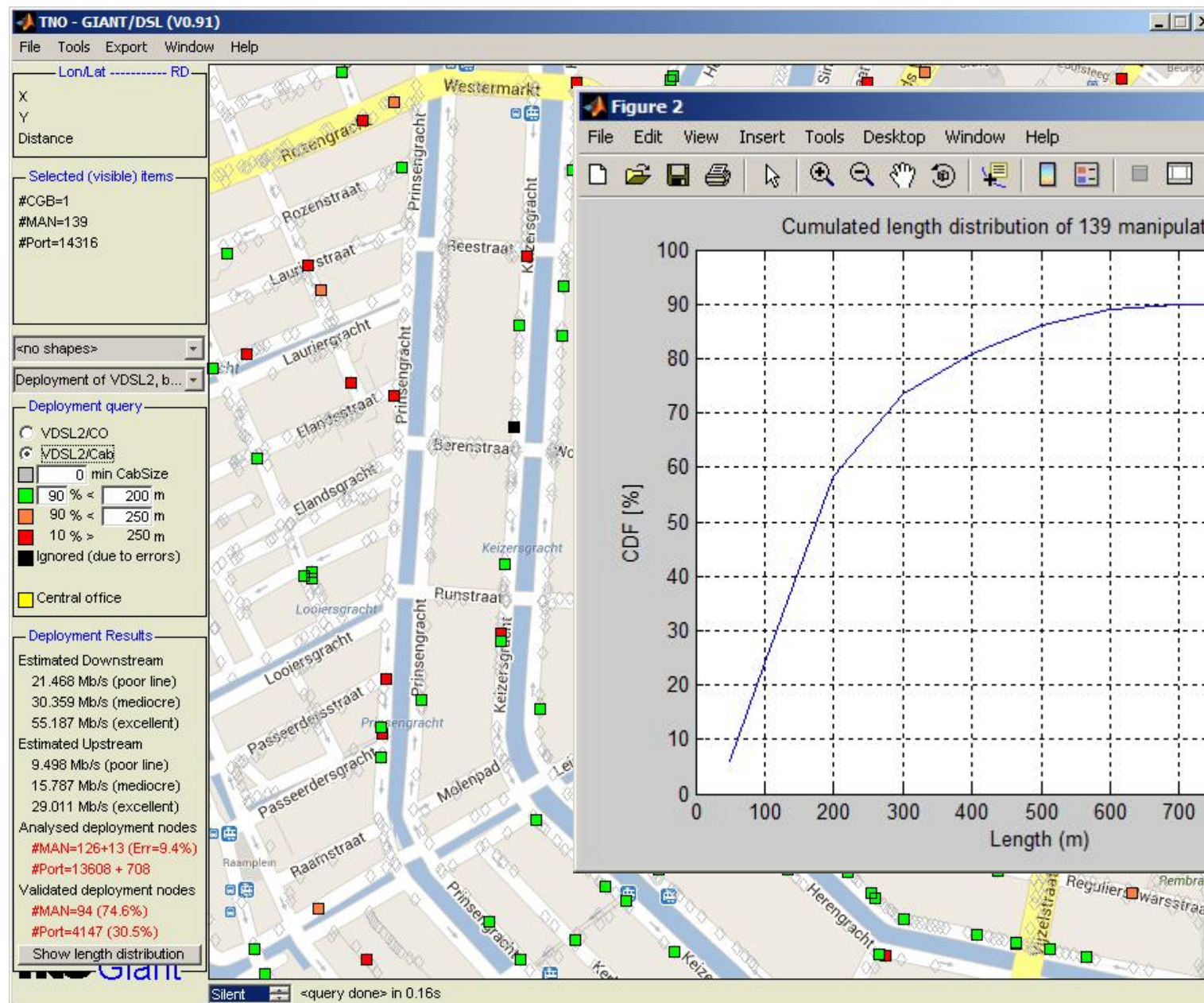


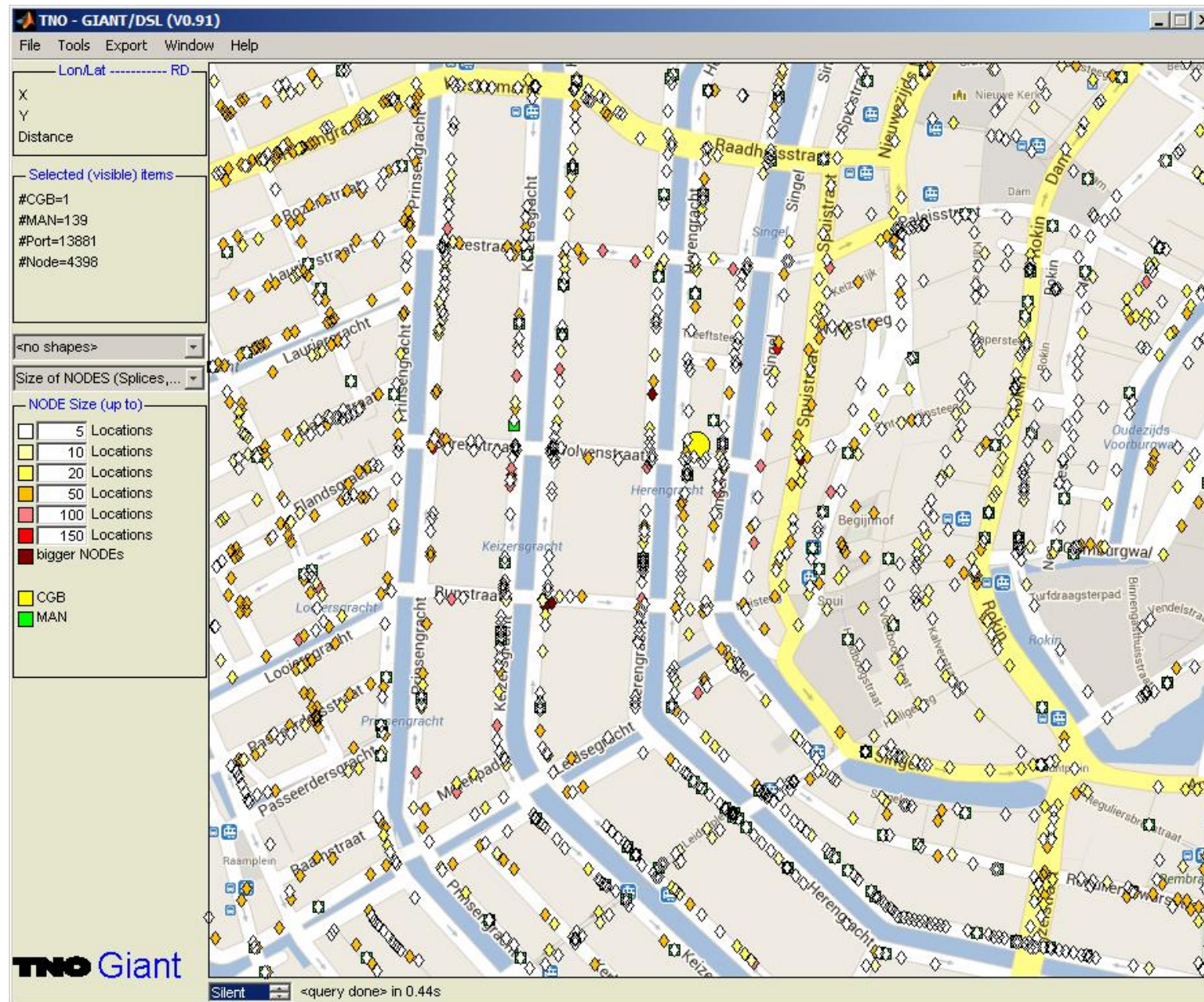
Somewhere in
the center of
Amsterdam



Somewhere in
the center of
Amsterdam

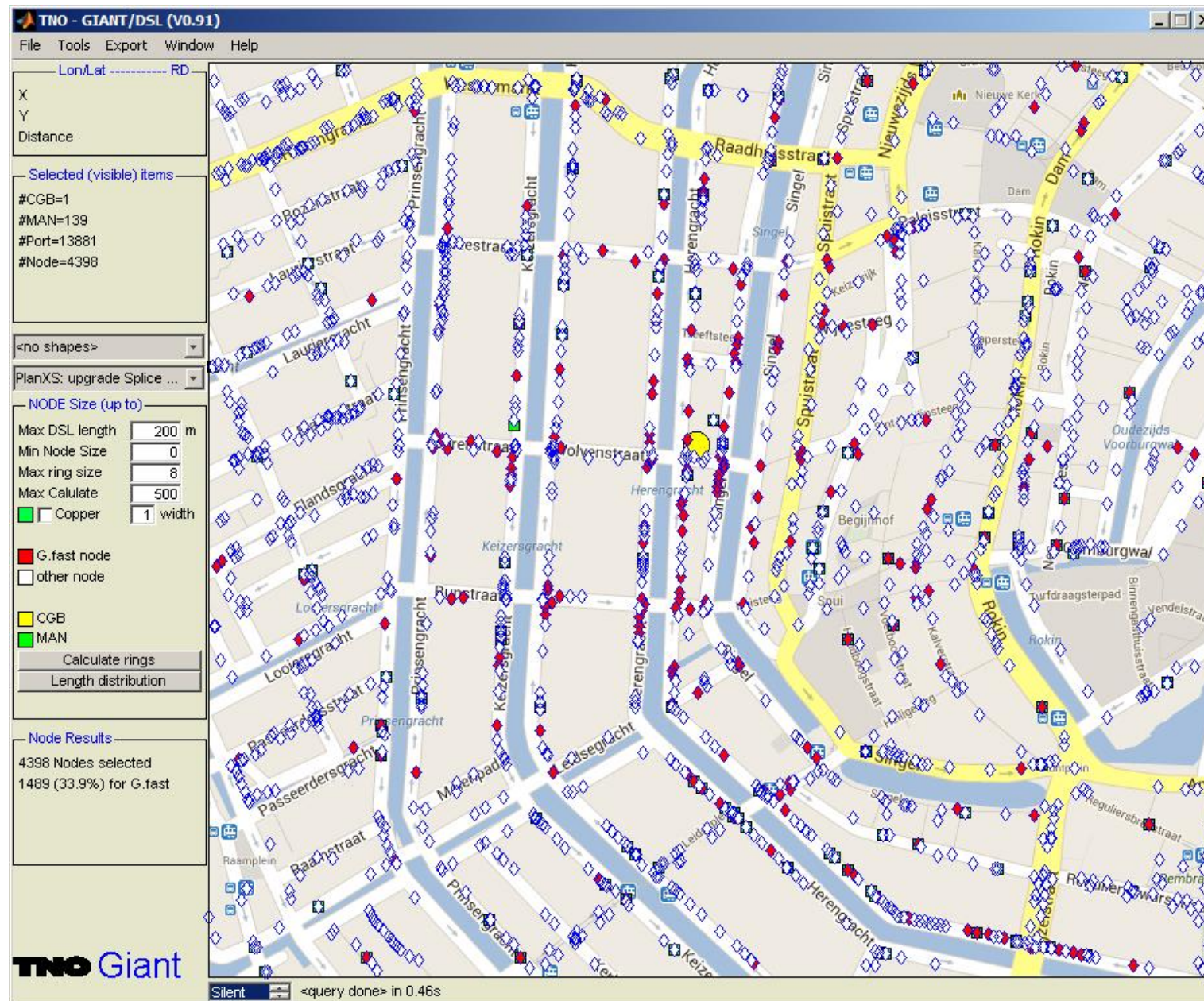
Many, but not
all, within 200m
from street
cabinets





Somewhere in
the center of
Amsterdam

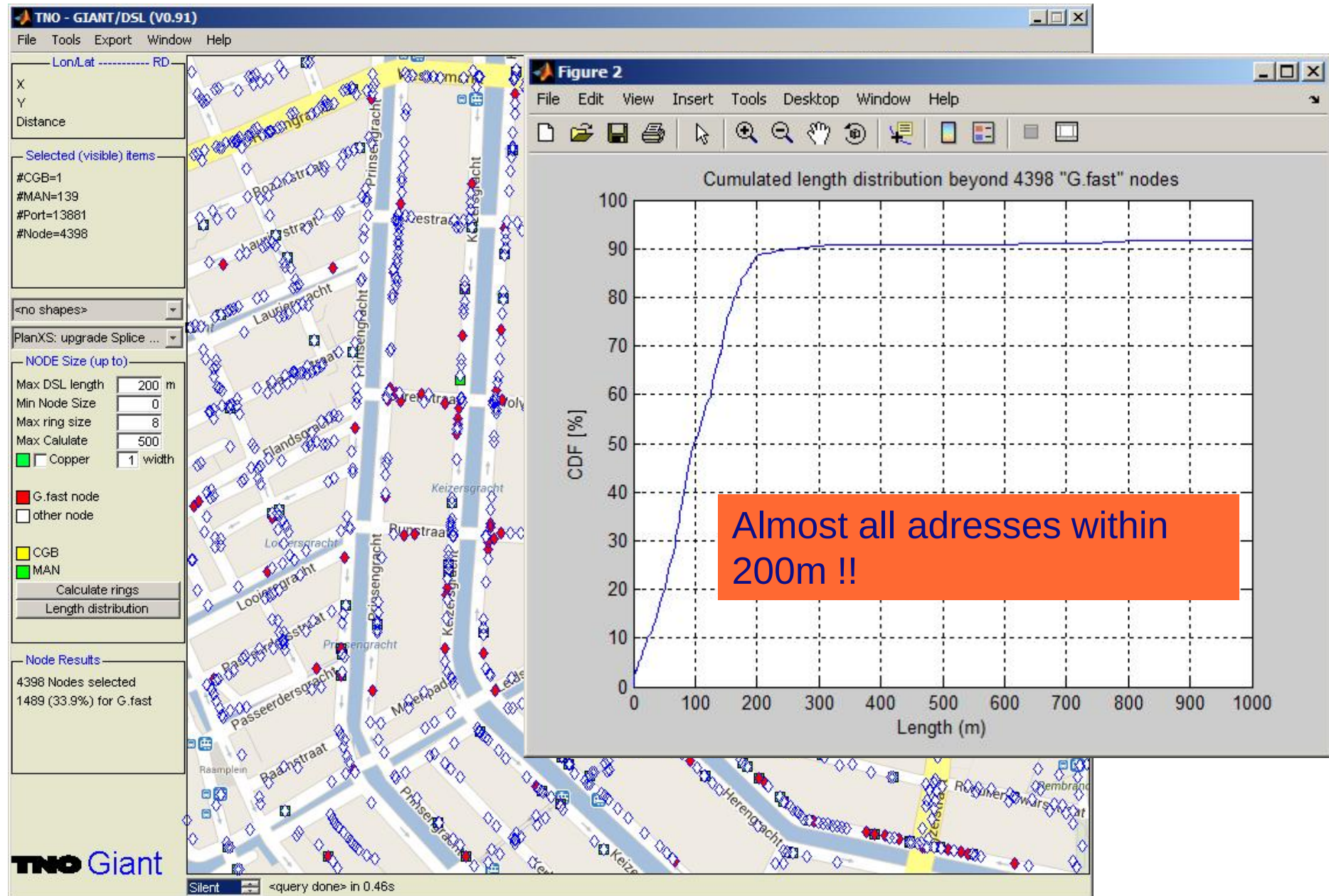
Here are the
locations of
cable splices



Somewhere in
the center of
Amsterdam

Here are the
locations of
cable splices ..

.. which are
more optimal to
serve as G.fast
node



Conclusions

Huge investments in 4GBB requires decision making on how to do that

- Hybrid FttH (with G.fast) and Full FttH are both solutions
- Selection is location-dependent (case by case)
- Adequate decisions require realistic assumptions

Methods, models and tools for decision making are under development

- Rule of thumb for CAPEX, based on address statistics
 - Hybrid reduces digging costs by a factor $\sqrt{n}$
 - Address statistics alone are not enough
- Advanced activation algorithm, accounting for copper-distance and CAPEX
 - Offered a first selection on G.fast nodes

Visual/geographic decision support tools provide grip on complexity

- Based on actual topology of wire infrastructure
- Can zoom-in on the problem where needed
- Relevant for strategic decision making before planning on digging

The complexity of 4GBB deployments requires a thorough understanding of geographic network characteristics

