ATDI

WEBINAR ATDI 12.05.20202

WEBINAR
5G coverage modeling and validation

HTZ: Radio Network Planning Tool

TODAY'S Speakers

ATDI Sydney office

Senior spectrum Engineer
Mr. Yahya Khaled
y.khaled@atdi-group.com

Yahya
(Presenter)

ATDI Sydney office

Senior RF Engineer
Mr. Farhad Sedghi
f.sedghi@atdi-group.com

Farhad
(Moderator)

TODAY'S AGENDA

Topics covered

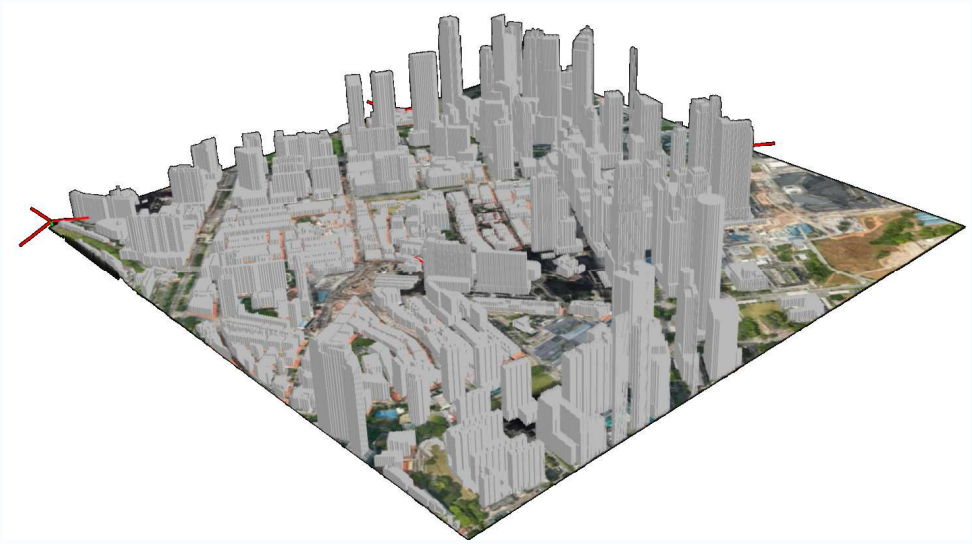
- Network importation & antenna placement challenges in 3D environment
- Antenna and power modeling: broadcast beam and Beam-forming capabilities
- 5G numerology & link budget auto computation (RBs/SC)
- SS-RSRP coverage predictions and analysis

TODAY'S AGENDA

Topics covered

- Statistical analysis
- Throughput predictions, massive MIMO configuration and Carrier aggregation
- Neighbor planning and Handover maps
- Coverage exportation and online publishing

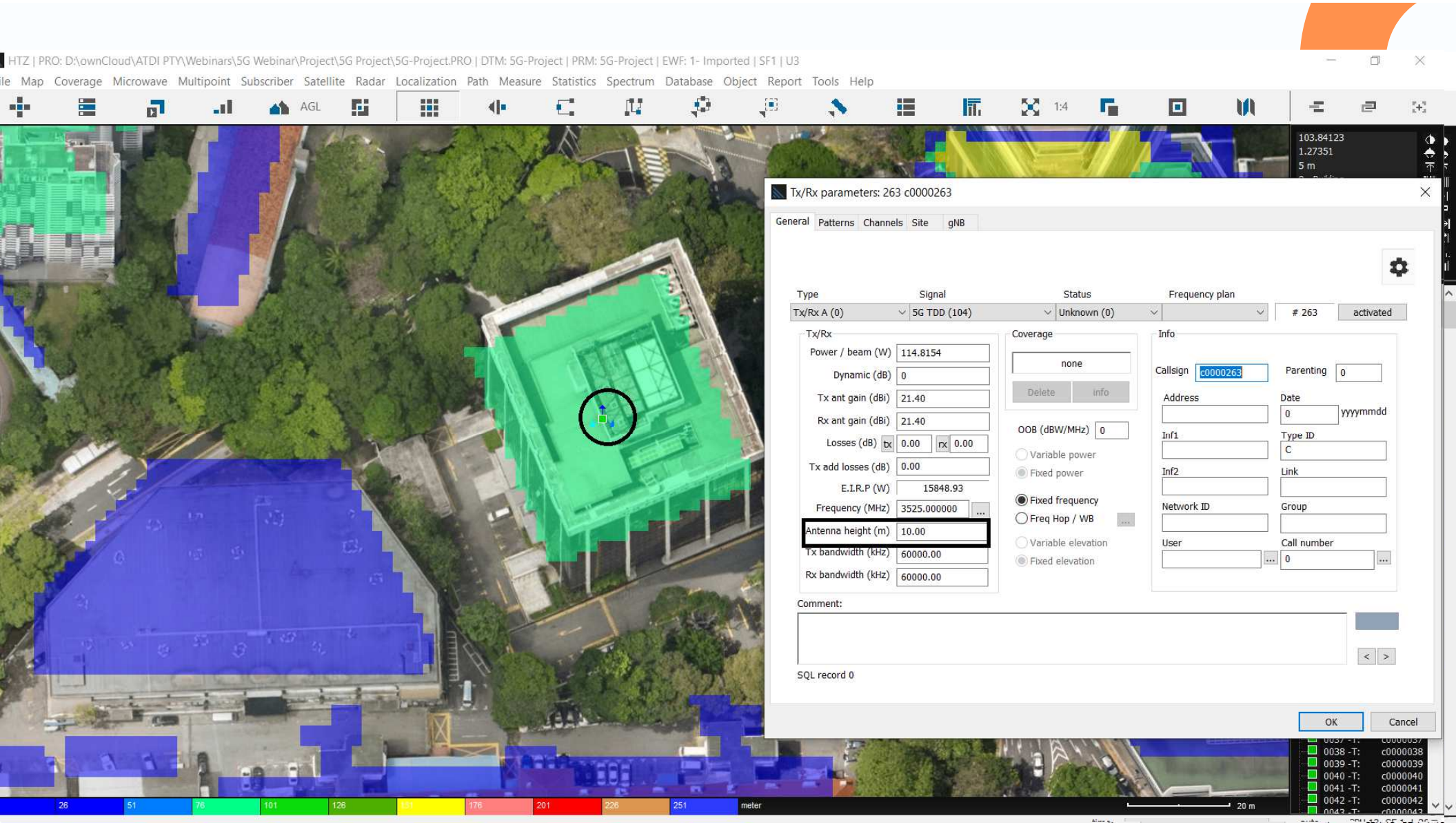
3D Antenna placement challenges



3D challenges

Antenna placement in 3D environment

.


HTZ | PRO: D:\ownCloud\ATDI PTY\Webinars\5G Webinar\Project\5G Project\5G-Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 1- Imported | SF1 | U3
File Map Coverage Microwave Multipoint Subscriber Satellite Radar Localization Path Measure Statistics Spectrum Database Object Report Tools Help
AGL
1:4
103.84123
1.27351
5 m
Tx/Rx parameters: 263 c0000263
General Patterns Channels Site gNB
Type
Signal
Status
Frequency plan
Tx/Rx A (0)
5G TDD (104)
Unknown (0)
263
activated
Tx/Rx
Power / beam (W) 114.8154
Dynamic (dB) 0
Tx ant gain (dBi) 21.40
Rx ant gain (dBi) 21.40
Losses (dB) tx 0.00 rx 0.00
Tx add losses (dB) 0.00
E.I.R.P (W) 15848.93
Frequency (MHz) 3525.000000
Antenna height (m) 10.00
Tx bandwidth (kHz) 60000.00
Rx bandwidth (kHz) 60000.00
Coverage
none
Delete
info
OOB (dBW/MHz) 0
Variable power
Fixed power
Fixed frequency
Freq Hop / WB
Variable elevation
Fixed elevation
Info
Callsign c0000263
Parenting 0
Address
Date 0 yyyymmdd
Inf1
Type ID C
Inf2
Link
Network ID
Group
User
Call number 0
Comment:
SQL record 0
OK
Cancel
0038 -T: c0000038
0039 -T: c0000039
0040 -T: c0000040
0041 -T: c0000041
0042 -T: c0000042
26 51 76 101 126 151 176 201 226 251 meter
20 m

Challenges

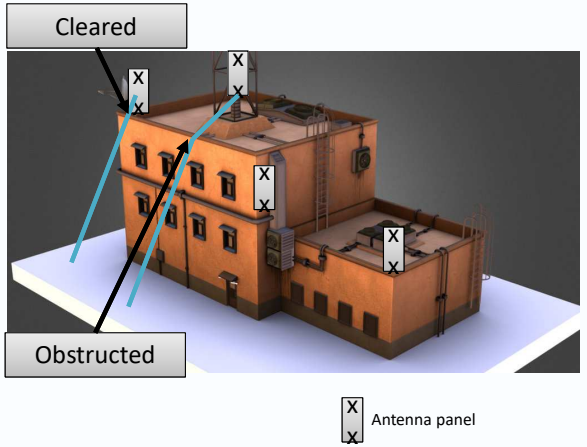
Challenges – antenna placement

❑ **Inaccurate sector/antenna coordinates**

- Both Vertical and horizontal planes
- Rough coordinates for new network
- Not necessarily maintained for existing networks
- Or maintained but over medium resolution model
- Minor discrepancies between 3D dataset and network parameters

- **Roof-top**
  - Is the antenna placed in the middle or at the Edge?
  - Is the antenna elevated or sinking below the roof height?

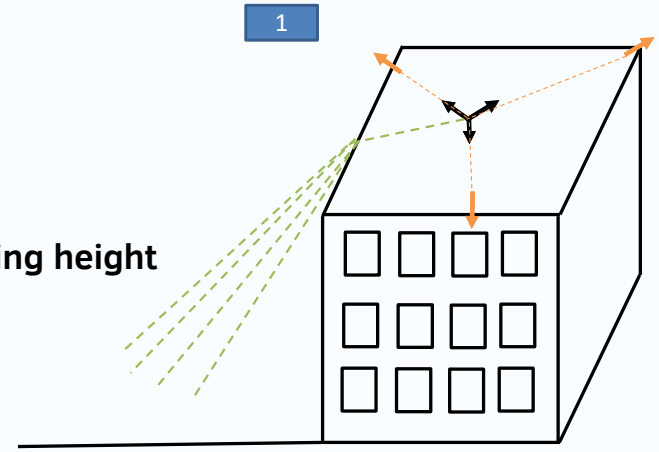
- **Building façade**
  - If below roof-top height; is it on the façade?

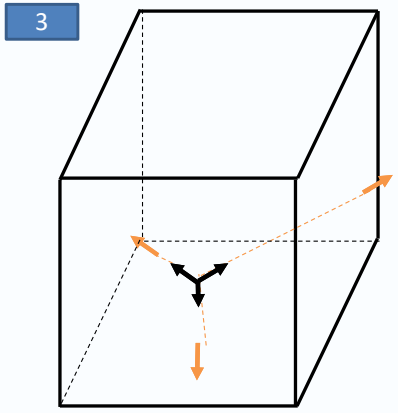


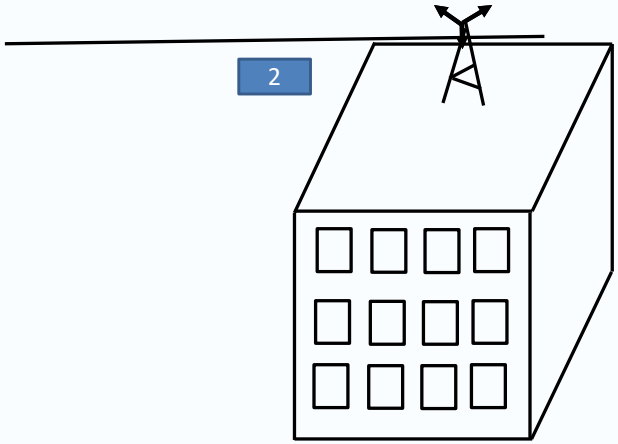
Challenges – antenna placement

Challenges

- **Exceeding building height?**
  - Stay as is or push to the edge?
- **Ant. height lower than building height**
  - Push to the edge (Façade)







Supplied location

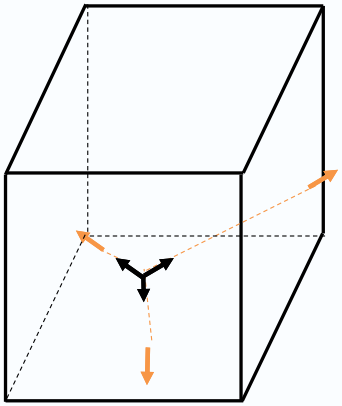
Updated location

Challenges

Challenges – antenna placement

❑ **Ant. height lower than building height**

- Push to the edge (Façade)



Supplied location

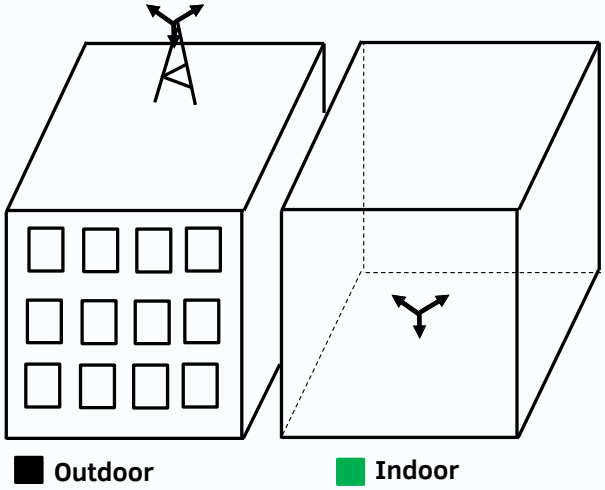
Updated location

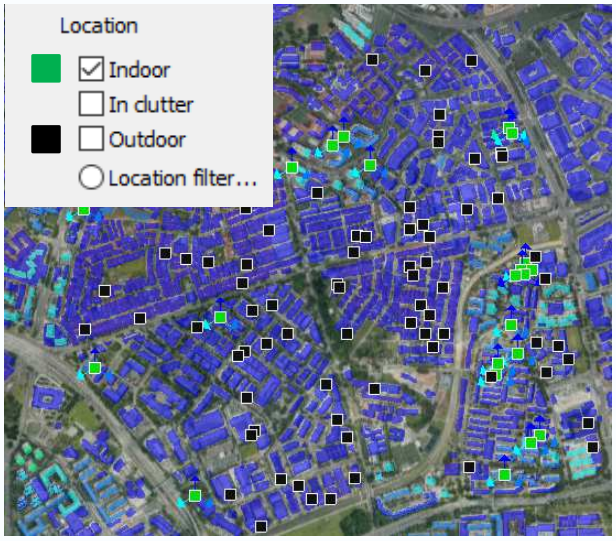
Challenges – antenna placement

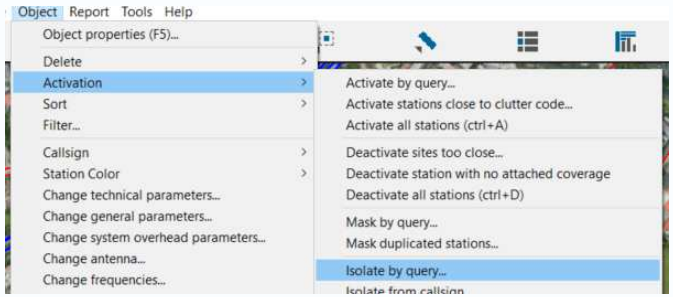
Challenges

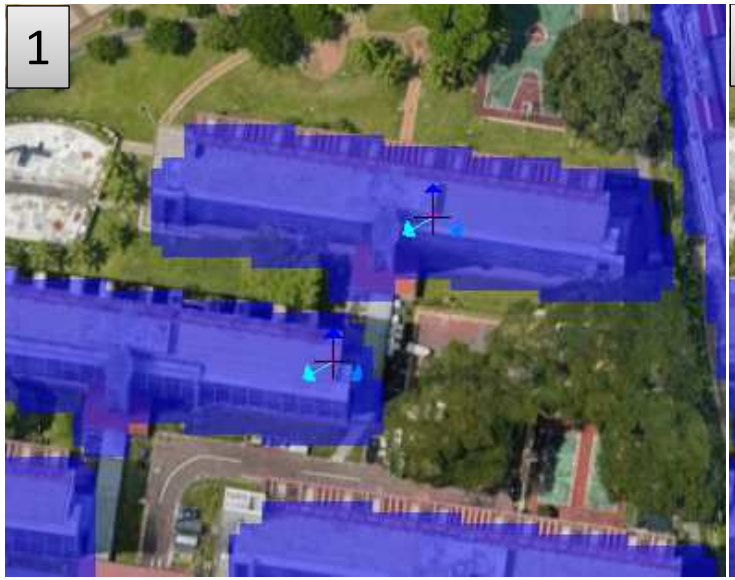
❑ **Identify those on Roof-top and façade?**

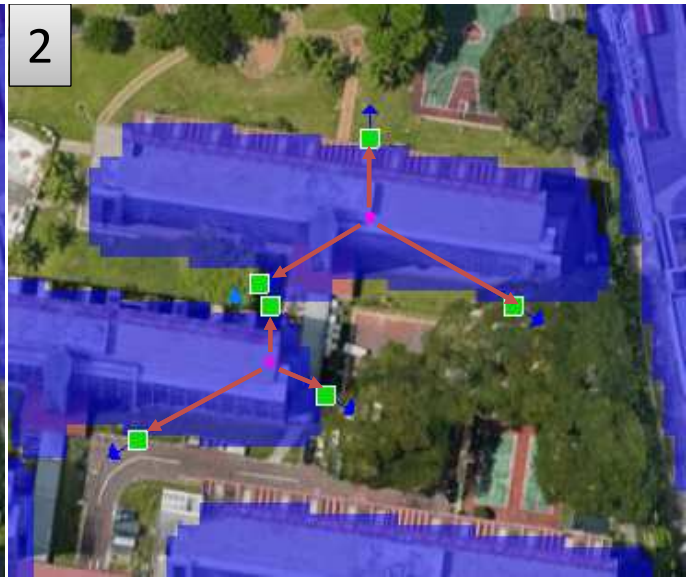
- If site height > building height then outdoor
- If site height < building height then indoor

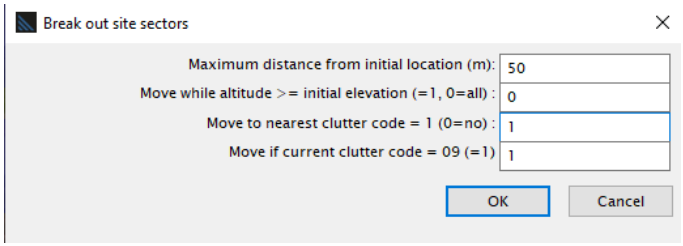


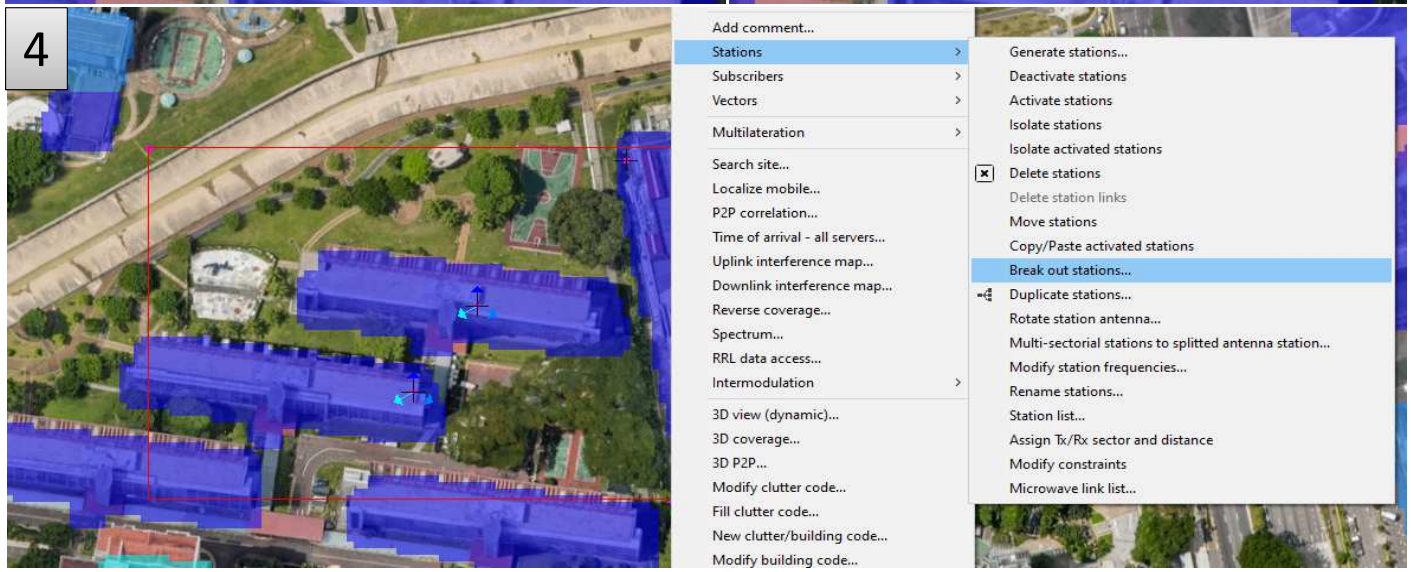












❑ Break out feature

- ➢ Targeted: Those falling within building and under Roof-top height
- ➢ Precise
  - ➢ How far to push the antenna
  - ➢ When to stop (new clutter)
- ➢ Maintaining sector orientation

Break-out DEMO

5G antenna modeling

Smart antenna

Beamforming and broadcast beams

.

Antenna – Beam-forming

Smart antenna

❑ NR, Type of beams:

- Broadcast (PBCH & SS) → Static
- Control (PUCCH, PDCCH)) → Static
- Traffic (PUSCH/PDSCH) → Dynamic

❑ What is a beam?

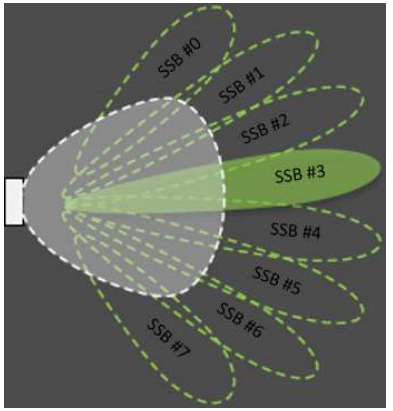
- Synthesized (formed electronically) antenna radiation pattern
- Can be steered, resulting in pattern sweeping
- Supplied as antenna radiation pattern envelope (MSI/PLT/PLN/…)

❑ Why broadcast beam pattern important for RF planning?

- Used for UE Initial Access Procedures
- Transmit "SS Block" carries the PSS, the SSS and the PBCH
- In IDLE mode the measurement is based on SS (Synchronization Signal)
- The UE transmits PRACH on a set of resources depending on the best SSB time index
- No broadcast beam reach → UEs can not connect → no coverage

❑ How to predict NR coverage?

- Establish broadcast beam radiation pattern (Individual SSBs or composite)
- Capture the beam gain (dBi)
- Calculate coverage
- Analyse SS-RSRP



Single beam (~10 degrees beamwidth)

SSB: Synchronization Signal and PBCH Block (cell search)
SS-RSRP: Synchronization Signal reference signal received power

Antenna – Beam-forming

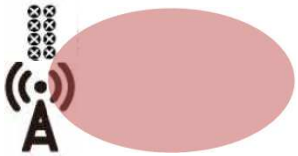
Smart antenna

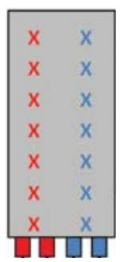
❑ **4G vs 5G antennas**

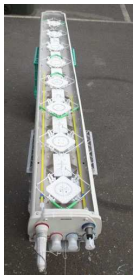
4G

4G

17 dBi



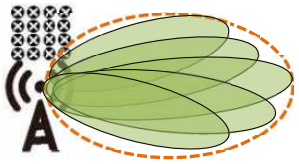




5G

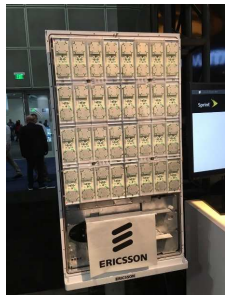
5G

21.5 dBi

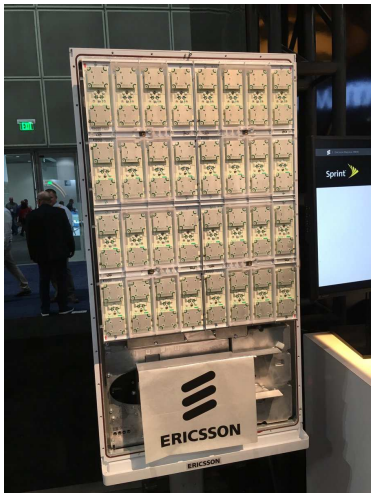


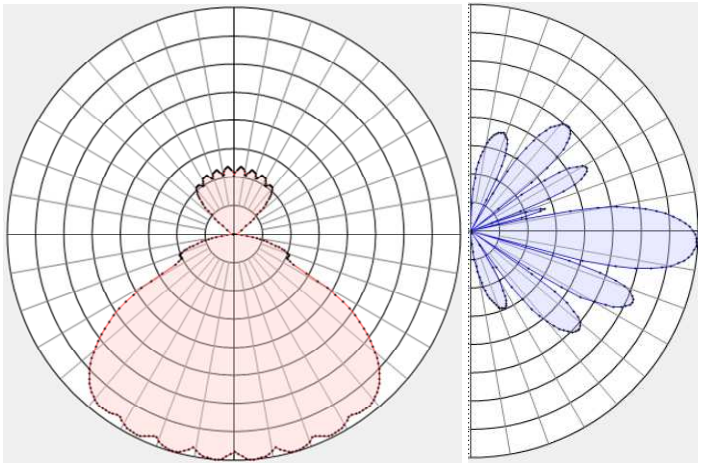
SSB0
SSB1
SSB2
SSB3
SSB4
SSB5
SSB6
SSB7

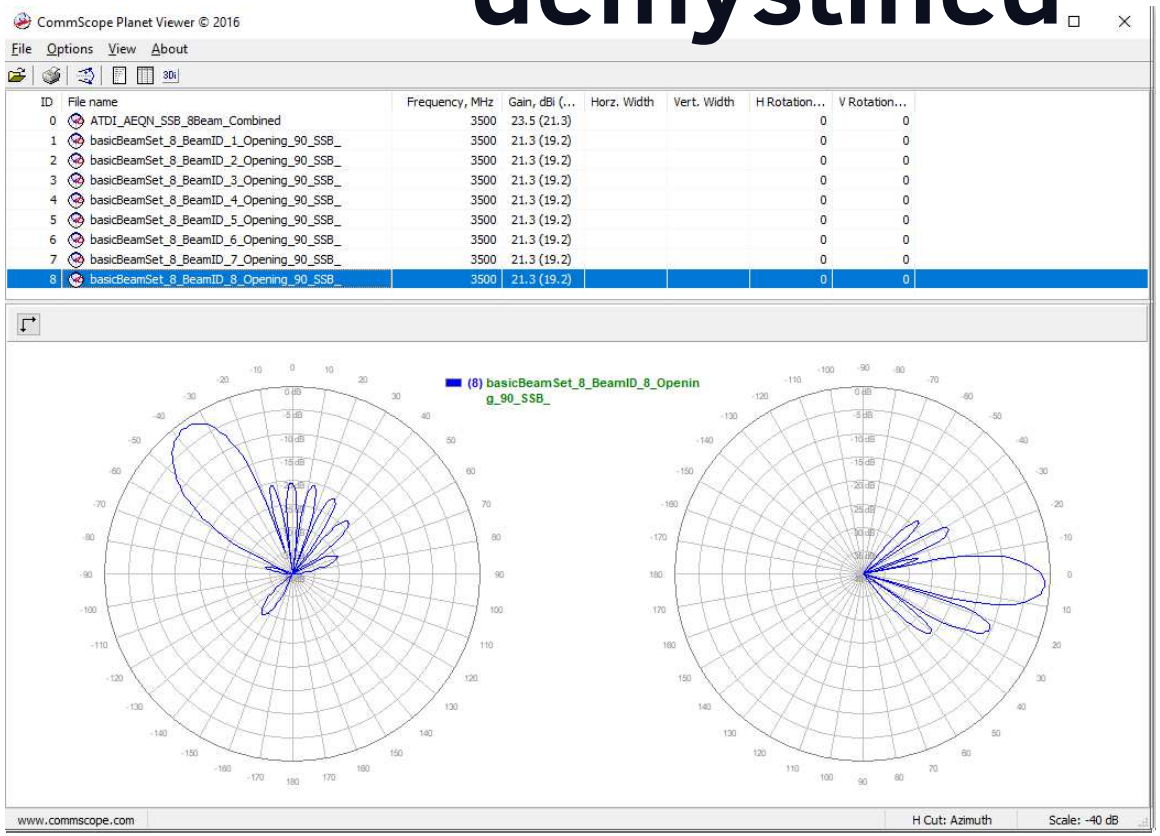
Beam-sweeping (5ms/20ms)



Broadcast beams demystified



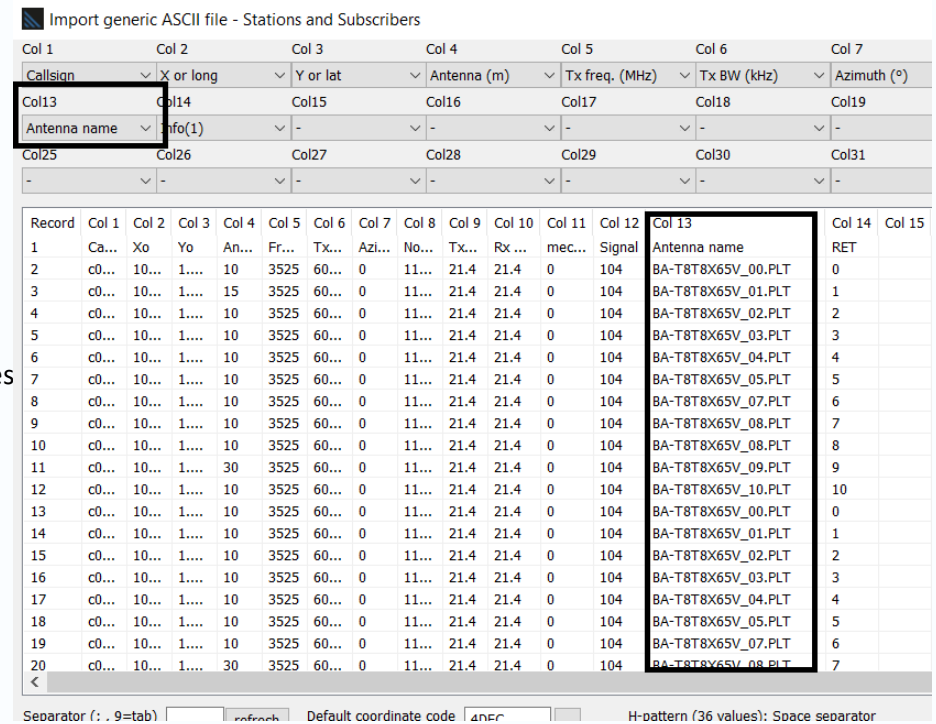


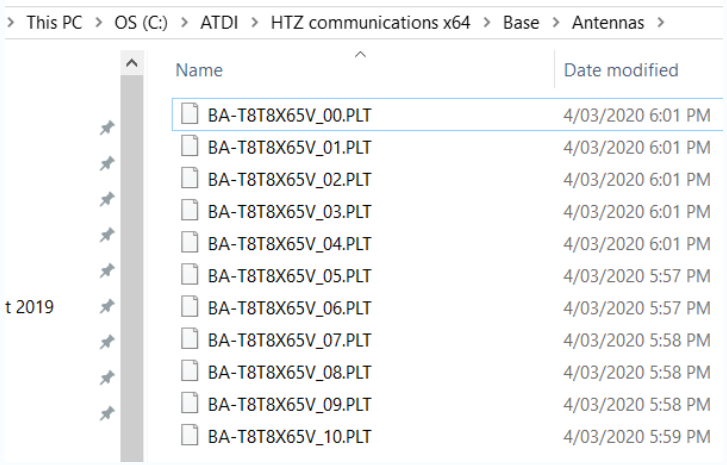


- ❑ 8 beams (64T64R)
- ❑ Beams at the edge operating at reduced gain

Managing Electrical & Mechanical tilt

- **Dealing with mechanical tilt**
  - From T/R pattern tab
- **Dealing with electrical tilt**
  - Preparing multiple radiation patterns during importation proces





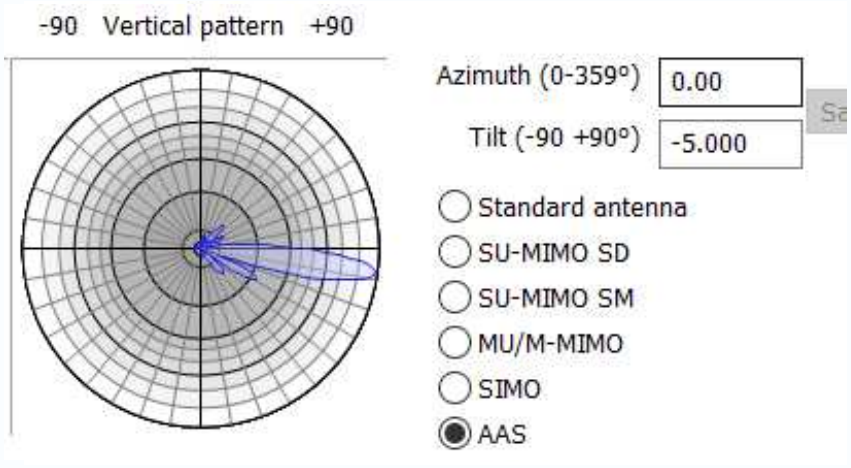
Managing Electrical & Mechanical tilt

❑ **Electrical tilt**

- ➢ Individual patterns supplied by vendor

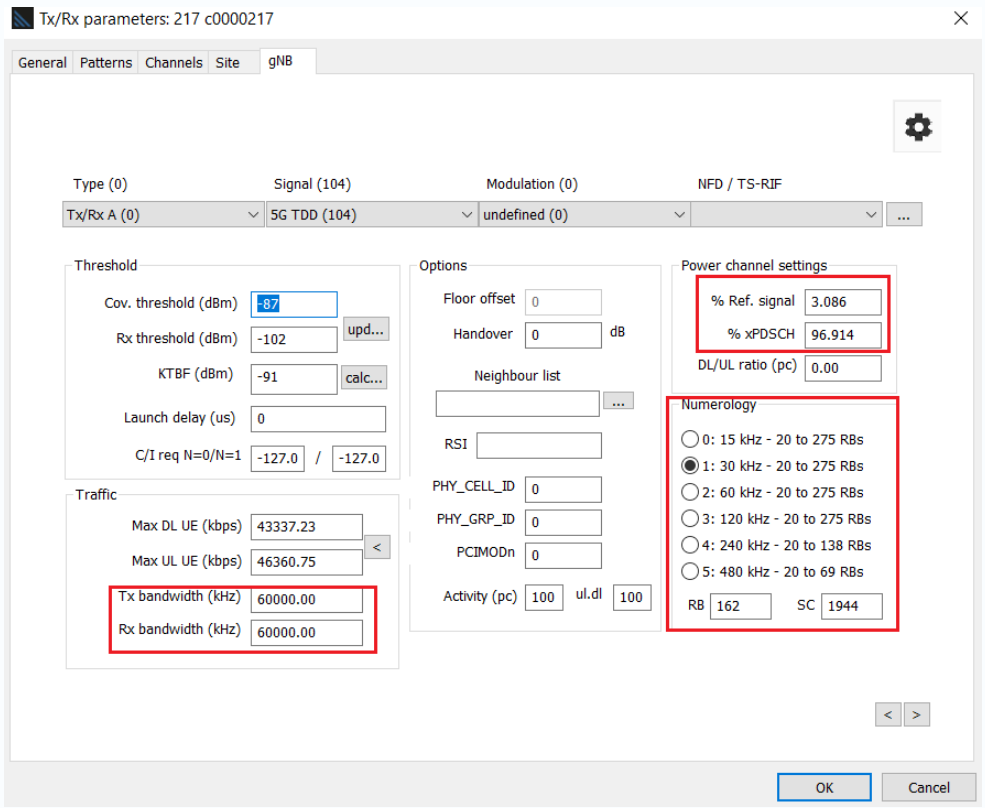
❑ **Mechanical tilt**

- ➢ Taken care of by HTZ directly



DEMO
(RET, Mechanical tilt)

5G Numerology



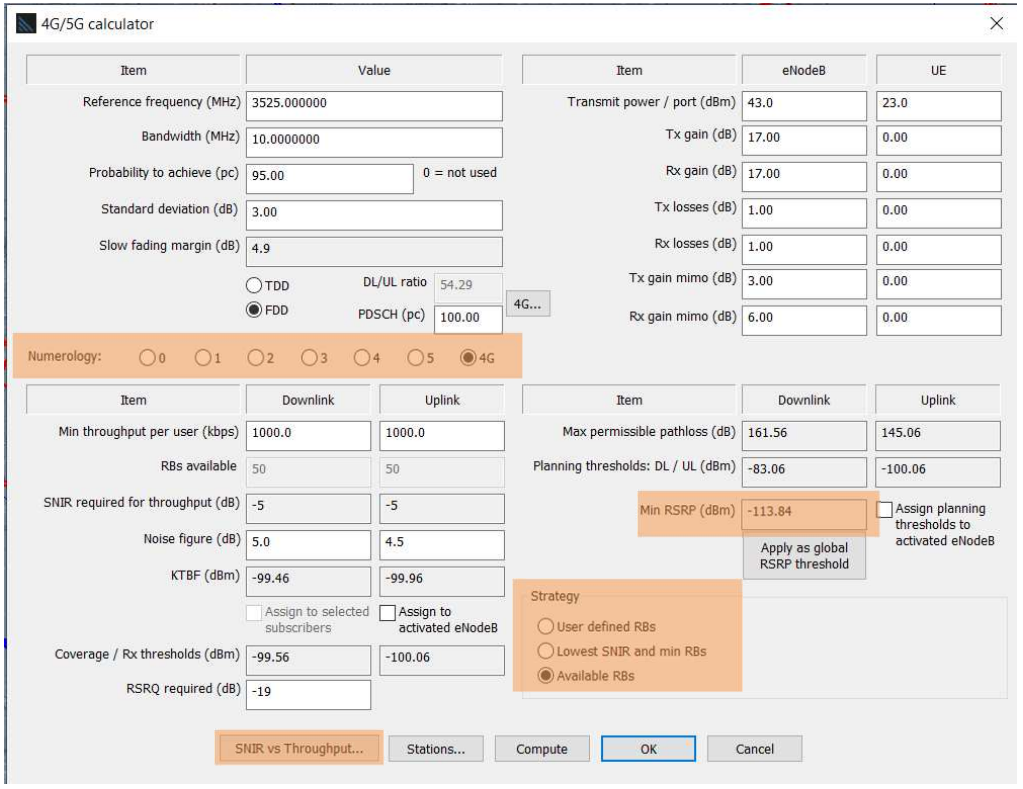
- ❑ **RS allocation percentage**
- ❑ **Traffic allocation percentage**
- ❑ **Number of resource blocks**
- ❑ **Total number of sub-carriers**

μ	Δf	$N_{RB}^{min,\mu}$	$N_{RB}^{max,\mu}$
0	15 kHz	20	275
1	30 kHz	20	275
2	60 kHz	20	275
3	120 kHz	20	275
4	240 kHz	20	138
5	480 kHz	20	69

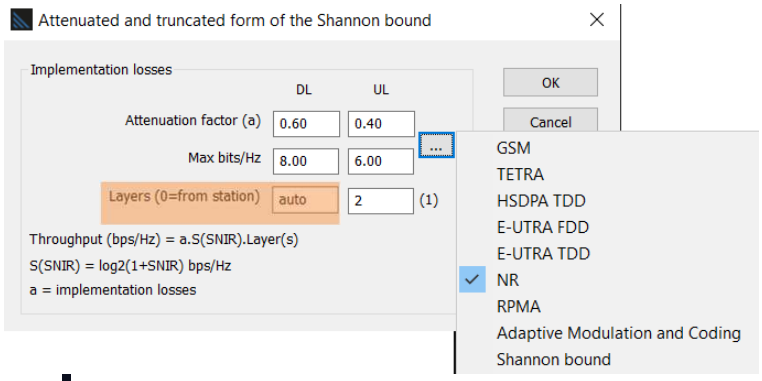
DEMO
(5G numerology)

Link budget calculator

- ❑ **5G Numerology added**
- ❑ **Resource allocation strategies updated**
  - ➢ User defined RBs: Dictate throughput and NxRBs and the tool computes the SINR
  - ➢ Lowest SNIR min RBs: Dictate throughput and tool computes min SINR then min RBs
  - ➢ Available RBs : Use all RBs, find min SINR to meet the throughput
- ❑ **Compute uplink-balanced RSRP**
- ❑ **SINR Vs throughput mapping (3GPP)**



SINR and throughput mapping



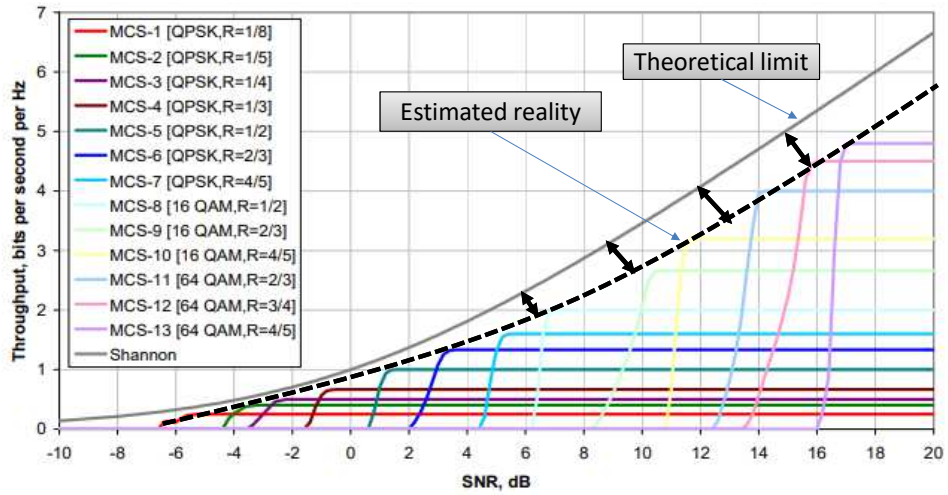
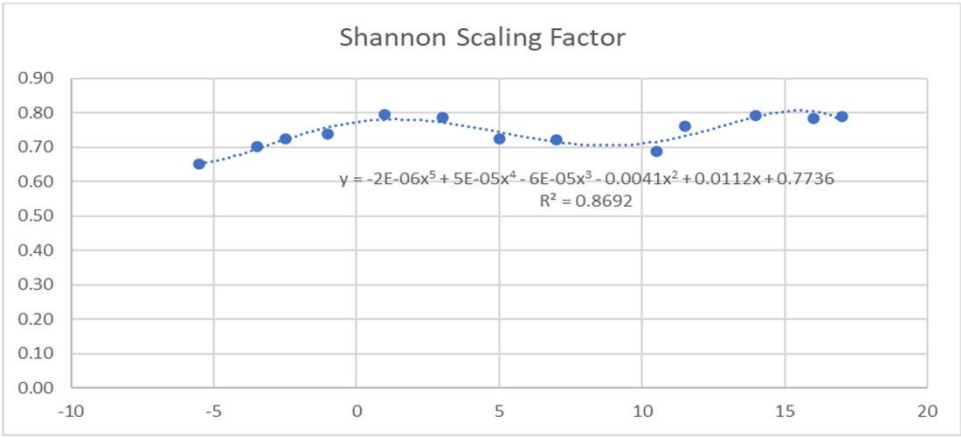


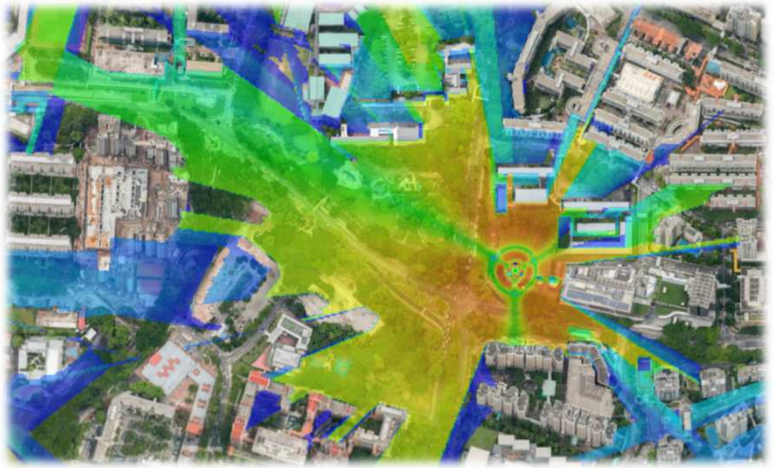
Figure A.4 Throughput of a set of Coding and Modulation Combinations, AWGN channels assumed



- ❑ f(SINR) → Throughput
- ❑ f(Throughput) → SINR required

DEMO
(Link budget)

5G coverage predictions



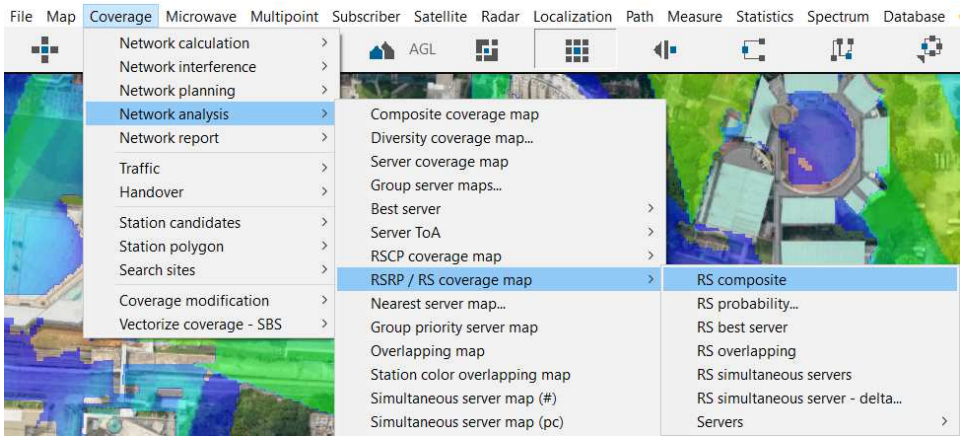
SS-RSRP prediction

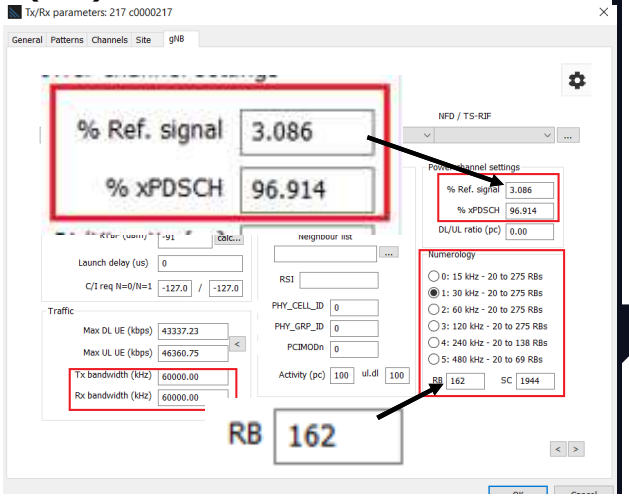
Using composed broadcast beam

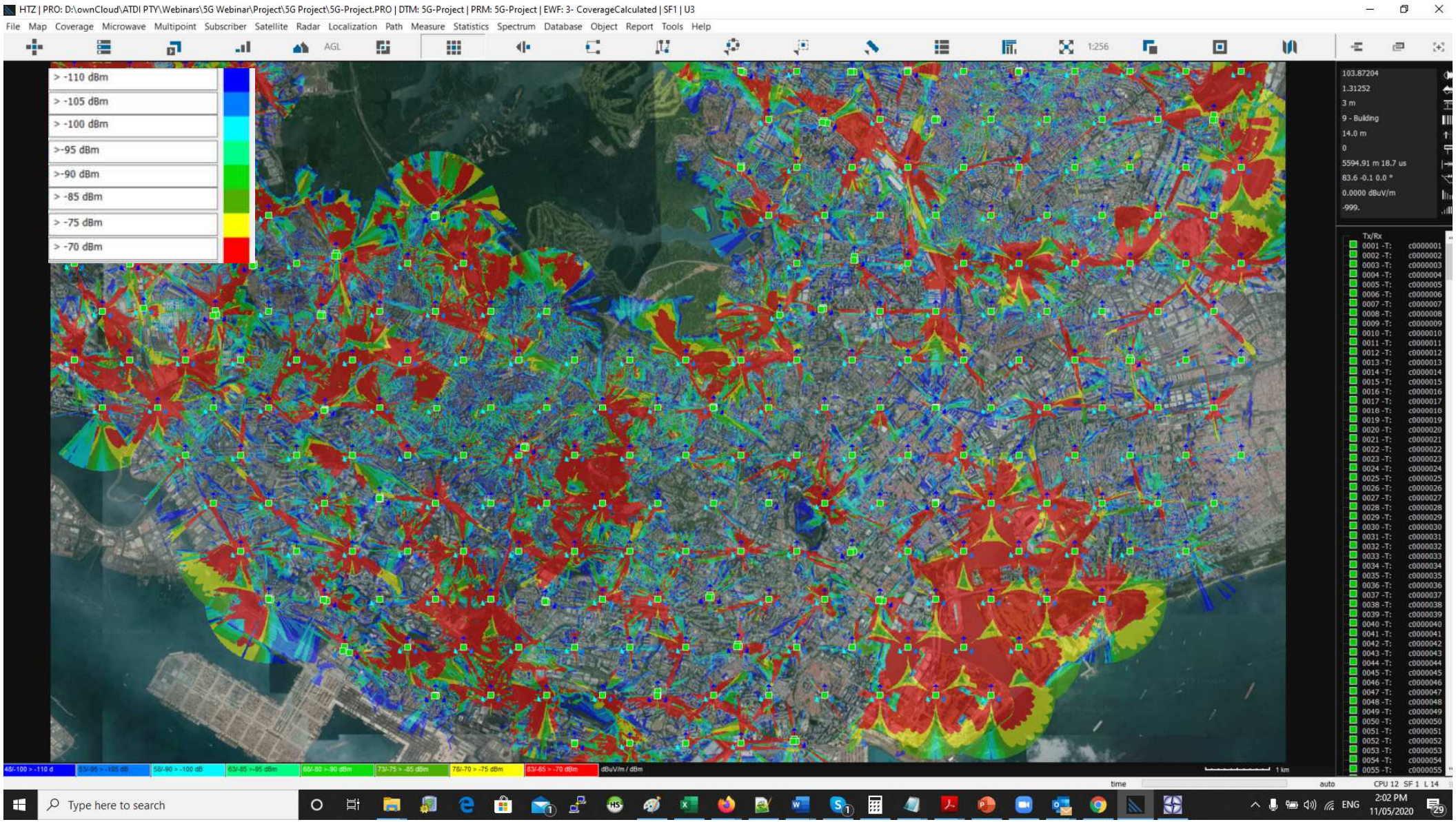
.

SS-RSRP

- **SS-RSRP: secondary synchronization reference signal received power**
  - Carried by the SSS (middle 20 RBs)
  - The only valid way to compare signal levels from individual cells and different operators
  - Important for cell selection and handover
  - Can be measured by drive-test tools – doesn't require connection with the cell
- **Reference Signal Power (dBm) = Total Tx Power (dBm) – 10 x log (RB x 12)**
- **SS-RS RE EIRP (dBm) = Reference Signal Power (dBm) + SSB beam gain (dBi)**






HTZ | PRO: D:\ownCloud\ATDI PTY\Webinars\5G Webinar\Project\5G Project\5G-Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
File Map Coverage Microwave Multipoint Subscriber Satellite Radar Localization Path Measure Statistics Spectrum Database Object Report Tools Help
> -110 dBm
> -105 dBm
> -100 dBm
>-95 dBm
>-90 dBm
> -85 dBm
> -75 dBm
> -70 dBm
103.87204
1.31252
3 m
9 - Building
14.0 m
0
5594.91 m 18.7 us
83.6 -0.1 0.0 °
0.0000 dBuV/m
-999.
Tx/Rx
dBuV/m / dBm
1 km
time
auto
CPU 12 SF 1 L 14
Type here to search
ENG
2:02 PM
11/05/2020

DEMO
(SS-RSRP prediction + Parallel comp)

Statistical analysis

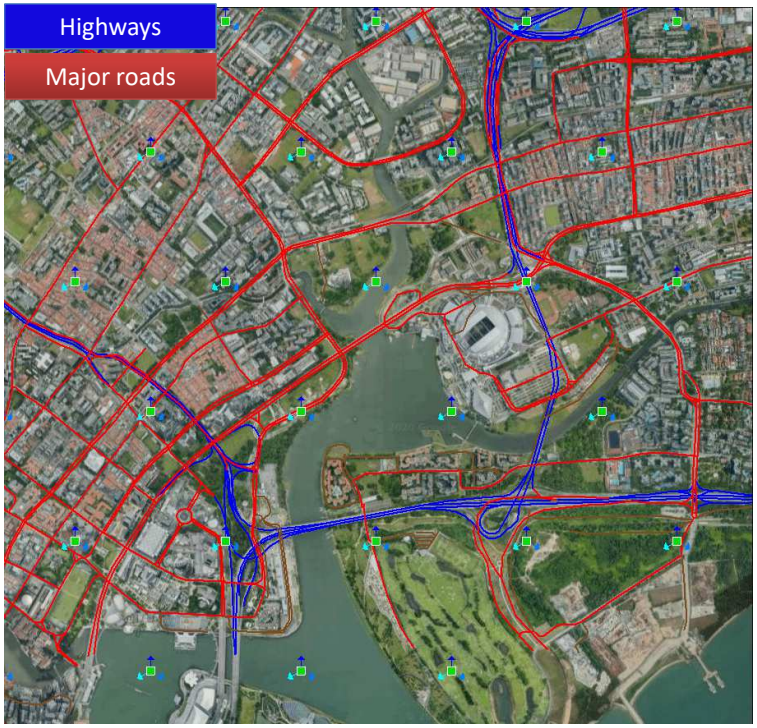
Outdoor reception analysis

Using GIS layer

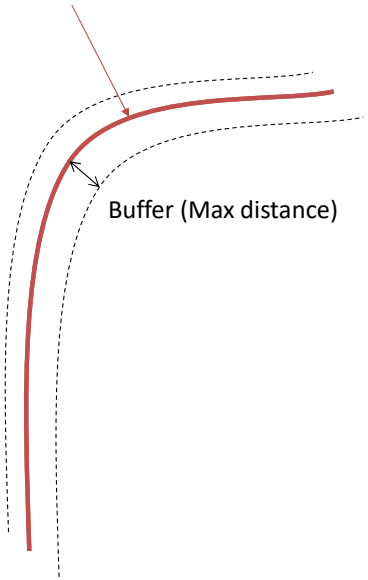
.

Outdoor coverage analysis

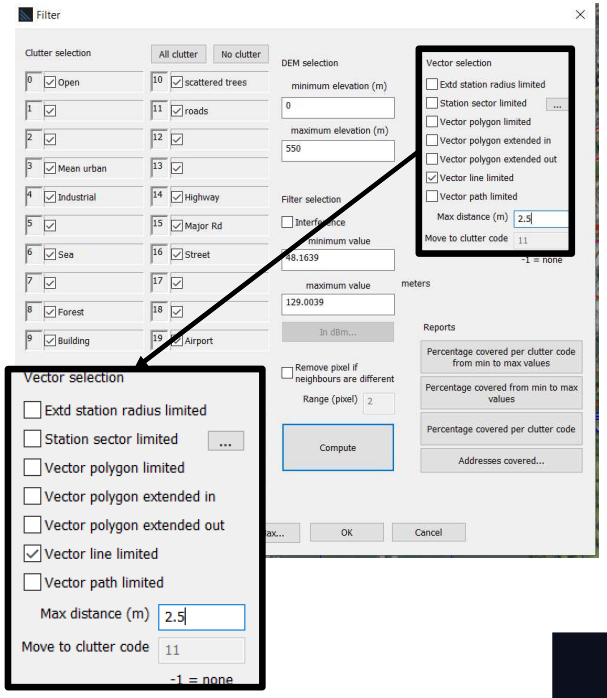
HTZ inbuilt GIS capabilities to manage vector data (points, polylines, polygons)

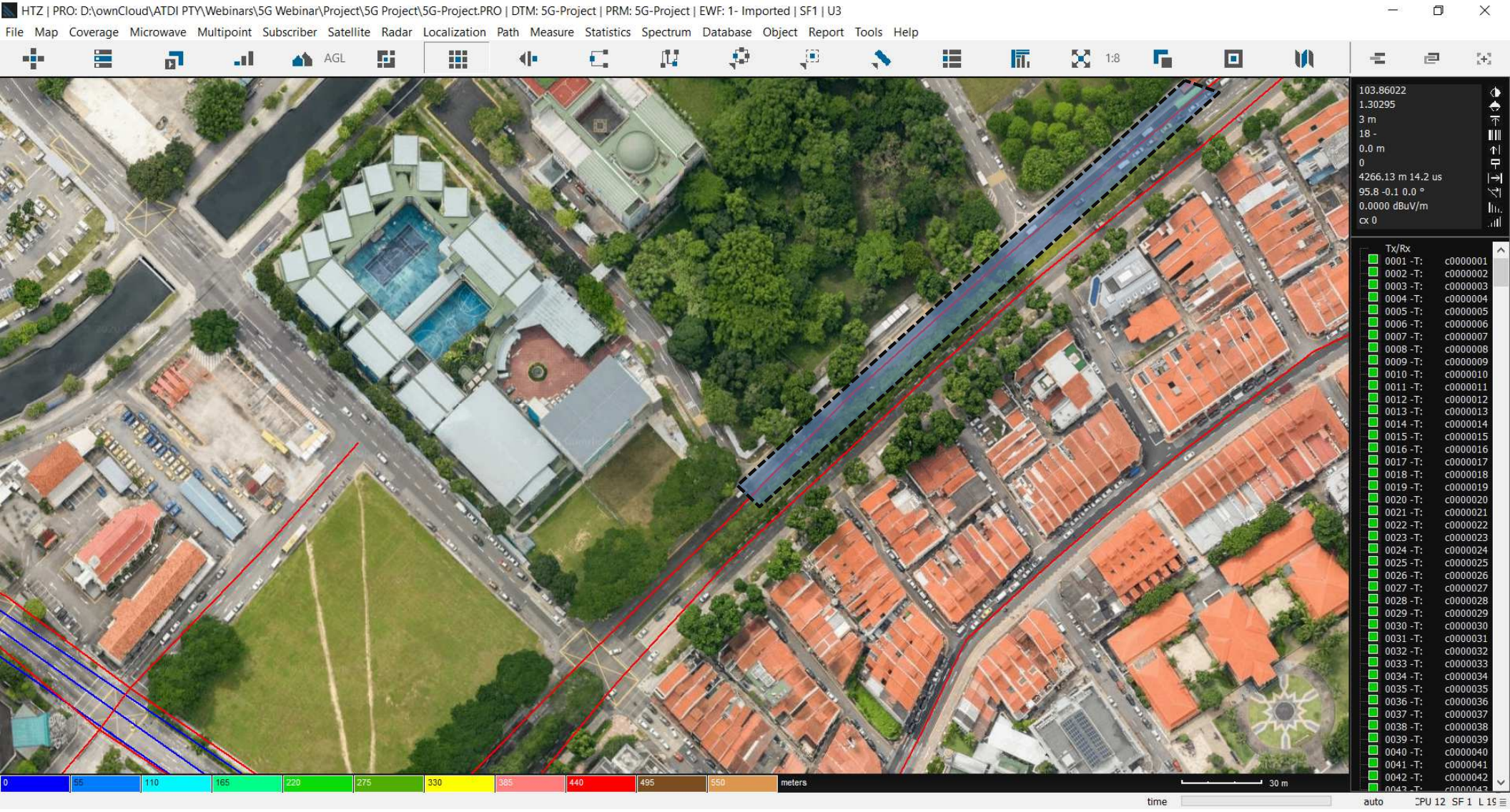


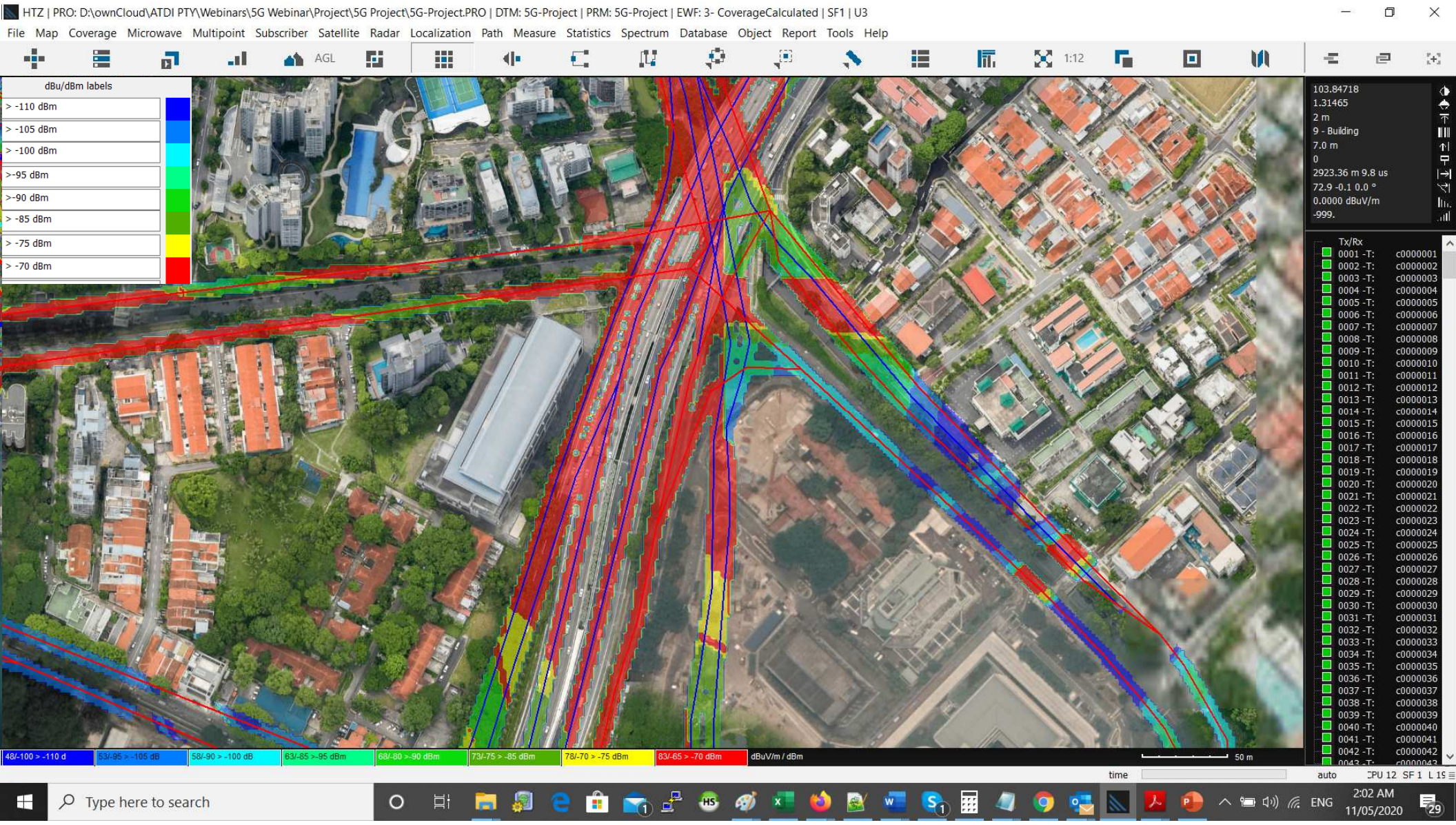
Road centre-line



Map→Filter→General filter




HTZ | PRO: D:\ownCloud\ATDI PTY\Webinars\5G Webinar\Project\5G Project\5G-Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 1- Imported | SF1 | U3
File Map Coverage Microwave Multipoint Subscriber Satellite Radar Localization Path Measure Statistics Spectrum Database Object Report Tools Help
AGL
1:8
103.86022
1.30295
3 m
18 -
0.0 m
0
4266.13 m 14.2 us
95.8 -0.1 0.0 °
0.0000 dBuV/m
cx 0
Tx/Rx
0001 -T: c0000001
0002 -T: c0000002
0003 -T: c0000003
0004 -T: c0000004
0005 -T: c0000005
0006 -T: c0000006
0007 -T: c0000007
0008 -T: c0000008
0009 -T: c0000009
0010 -T: c0000010
0011 -T: c0000011
0012 -T: c0000012
0013 -T: c0000013
0014 -T: c0000014
0015 -T: c0000015
0016 -T: c0000016
0017 -T: c0000017
0018 -T: c0000018
0019 -T: c0000019
0020 -T: c0000020
0021 -T: c0000021
0022 -T: c0000022
0023 -T: c0000023
0024 -T: c0000024
0025 -T: c0000025
0026 -T: c0000026
0027 -T: c0000027
0028 -T: c0000028
0029 -T: c0000029
0030 -T: c0000030
0031 -T: c0000031
0032 -T: c0000032
0033 -T: c0000033
0034 -T: c0000034
0035 -T: c0000035
0036 -T: c0000036
0037 -T: c0000037
0038 -T: c0000038
0039 -T: c0000039
0040 -T: c0000040
0041 -T: c0000041
0042 -T: c0000042
0 55 110 165 220 275 330 385 440 495 550 meters
30 m
time
auto
CPU 12 SF 1


HTZ | PRO: D:\ownCloud\ATDI PTY\Webinars\5G Webinar\Project\5G Project\5G-Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
File Map Coverage Microwave Multipoint Subscriber Satellite Radar Localization Path Measure Statistics Spectrum Database Object Report Tools Help
AGL
1:12
dBu/dBm labels
> -110 dBm
> -105 dBm
> -100 dBm
>-95 dBm
>-90 dBm
> -85 dBm
> -75 dBm
> -70 dBm
103.84718
1.31465
2 m
9 - Building
7.0 m
0
2923.36 m 9.8 us
72.9 -0.1 0.0 °
0.0000 dBuV/m
-999.
Tx/Rx
0001 -T: c0000001
0002 -T: c0000002
0003 -T: c0000003
0004 -T: c0000004
0005 -T: c0000005
0006 -T: c0000006
0007 -T: c0000007
0008 -T: c0000008
0009 -T: c0000009
0010 -T: c0000010
0011 -T: c0000011
0012 -T: c0000012
0013 -T: c0000013
0014 -T: c0000014
0015 -T: c0000015
0016 -T: c0000016
0017 -T: c0000017
0018 -T: c0000018
0019 -T: c0000019
0020 -T: c0000020
0021 -T: c0000021
0022 -T: c0000022
0023 -T: c0000023
0024 -T: c0000024
0025 -T: c0000025
0026 -T: c0000026
0027 -T: c0000027
0028 -T: c0000028
0029 -T: c0000029
0030 -T: c0000030
0031 -T: c0000031
0032 -T: c0000032
0033 -T: c0000033
0034 -T: c0000034
0035 -T: c0000035
0036 -T: c0000036
0037 -T: c0000037
0038 -T: c0000038
0039 -T: c0000039
0040 -T: c0000040
0041 -T: c0000041
0042 -T: c0000042
48/-100 > -110 d
53/-95 > -105 dB
58/-90 > -100 dB
63/-85 >-95 dBm
68/-80 >-90 dBm
73/-75 > -85 dBm
78/-70 > -75 dBm
83/-65 > -70 dBm
dBuV/m / dBm
50 m
time
auto
CPU 12 SF 1 L 19
Type here to search
ENG
2:02 AM
11/05/2020

DEMO
(RSRP filter analysis)

MIMO

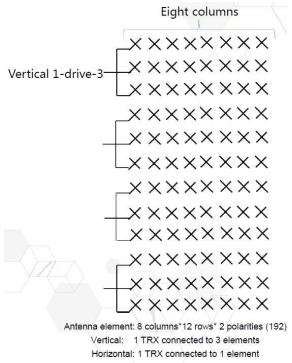
Massive MIMO and throughput

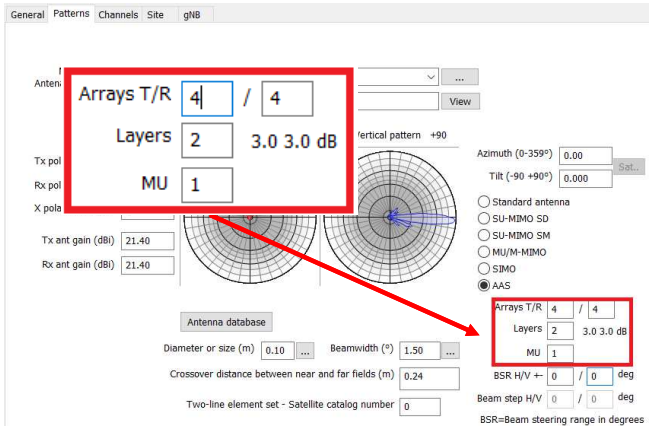
Throughput predictions, massive MIMO configuration and Carrier aggregation

.

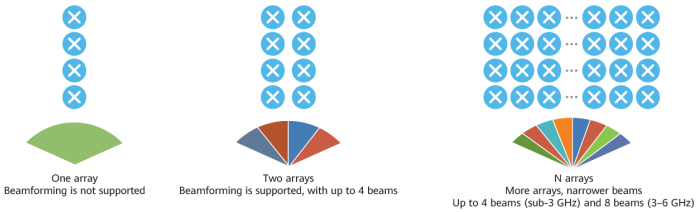
WEBINAR 5G Technology | 2020

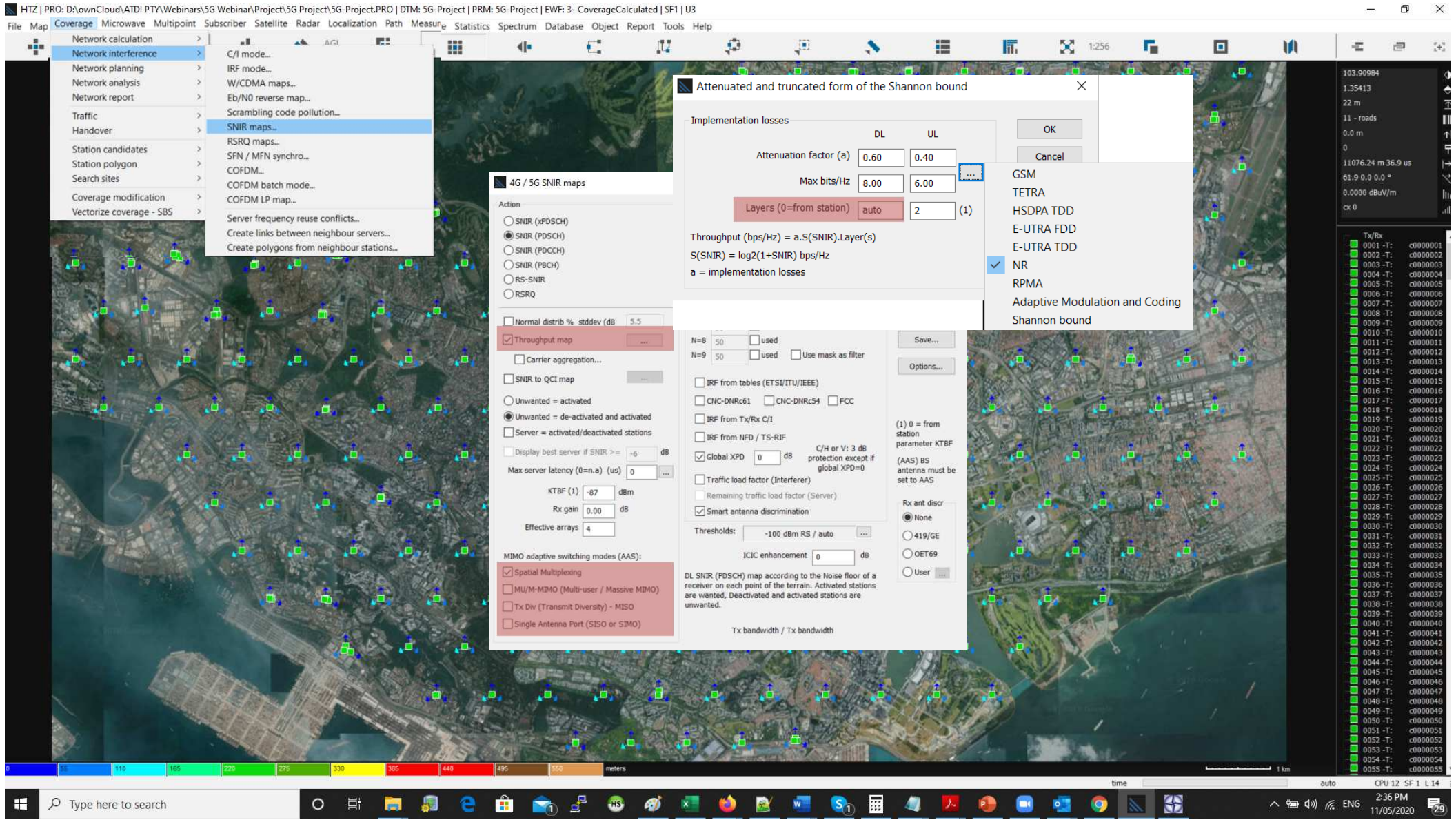
NR Smart Antenna MIMO





- **Per cell MIMO configuration**
- **Arrays: Number arrays for traffic beams**
  - Up to 4 for 32x32 Antenna
  - Up to 8 for 64x64 antenna
- **<u>Layers</u>: Number of spatial layers per UE**
  - Same frequency & time but different antenna elements
- **MU: Number of concurrent users (Multi-User MIMO)**
  - Same frequency & time but different spatial beam



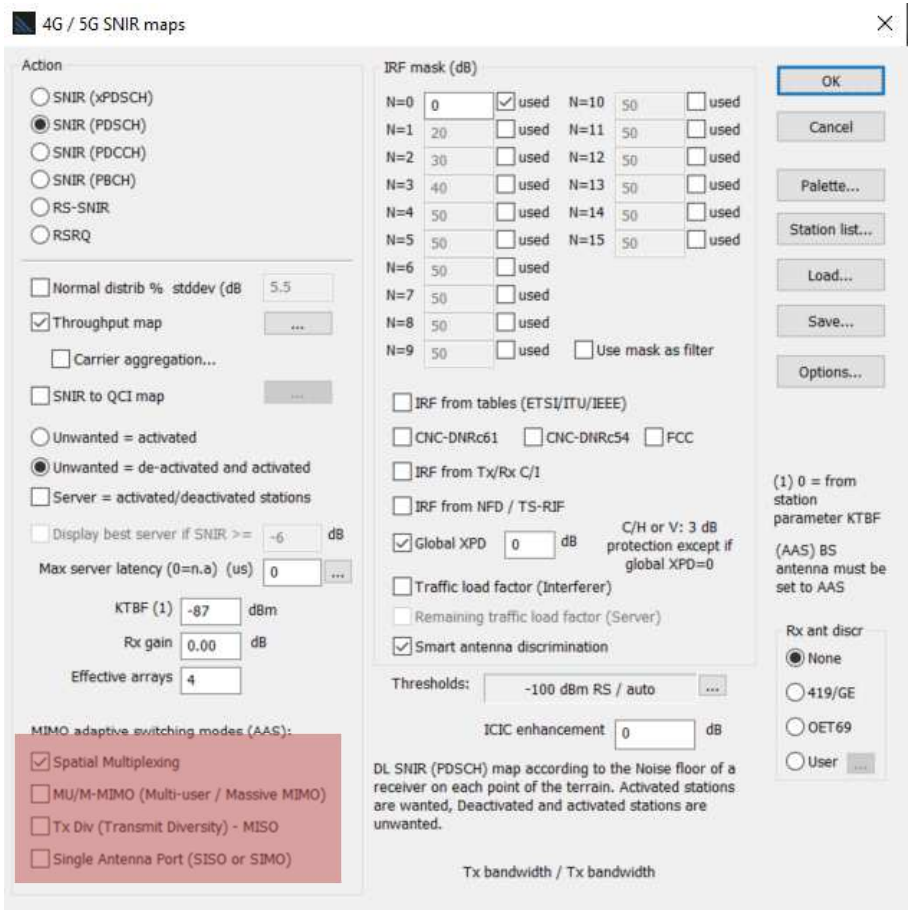

HTZ | PRO: D:\ownCloud\ATDI PTY\Webinars\5G Webinar\Project\5G Project\5G-Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
File Map Coverage Microwave Multipoint Subscriber Satellite Radar Localization Path Measure Statistics Spectrum Database Object Report Tools Help
Network calculation
Network interference
Network planning
Network analysis
Network report
Traffic
Handover
Station candidates
Station polygon
Search sites
Coverage modification
Vectorize coverage - SBS
C/I mode...
IRF mode...
W/CDMA maps...
Eb/N0 reverse map...
Scrambling code pollution...
SNIR maps...
RSRQ maps...
SFN / MFN synchro...
COFDM...
COFDM batch mode...
COFDM LP map...
Server frequency reuse conflicts...
Create links between neighbour servers...
Create polygons from neighbour stations...
4G / 5G SNIR maps
Action
SNIR (xPDSCH)
SNIR (PDSCH)
SNIR (PDCCH)
SNIR (PBCH)
RS-SNIR
RSRQ
Normal distrib % stddev (dB
Throughput map
Carrier aggregation...
SNIR to QCI map
Unwanted = activated
Unwanted = de-activated and activated
Server = activated/deactivated stations
Display best server if SNIR >=
Max server latency (0=n.a) (us)
KTBF (1)
Rx gain
Effective arrays
MIMO adaptive switching modes (AAS):
Spatial Multiplexing
MU/M-MIMO (Multi-user / Massive MIMO)
Tx Div (Transmit Diversity) - MISO
Single Antenna Port (SISO or SIMO)
Attenuated and truncated form of the Shannon bound
Implementation losses
DL
UL
Attenuation factor (a)
Max bits/Hz
Layers (0=from station)
Throughput (bps/Hz) = a.S(SNIR).Layer(s)
S(SNIR) = log2(1+SNIR) bps/Hz
a = implementation losses
OK
Cancel
GSM
TETRA
HSDPA TDD
E-UTRA FDD
E-UTRA TDD
NR
RPMA
Adaptive Modulation and Coding
Shannon bound
Save...
Options...
IRF from tables (ETSI/ITU/IEEE)
CNC-DNRc61
CNC-DNRc54
FCC
IRF from Tx/Rx C/I
IRF from NFD / TS-RIF
Global XPD
C/H or V: 3 dB protection except if global XPD=0
Traffic load factor (Interferer)
Remaining traffic load factor (Server)
Smart antenna discrimination
Thresholds:
ICIC enhancement
DL SNIR (PDSCH) map according to the Noise floor of a receiver on each point of the terrain. Activated stations are wanted, Deactivated and activated stations are unwanted.
Tx bandwidth / Tx bandwidth
(1) 0 = from station parameter KTBF
(AAS) BS antenna must be set to AAS
Rx ant discr
None
419/GE
OET69
User
meters
1 km
Type here to search
ENG
2:36 PM
11/05/2020

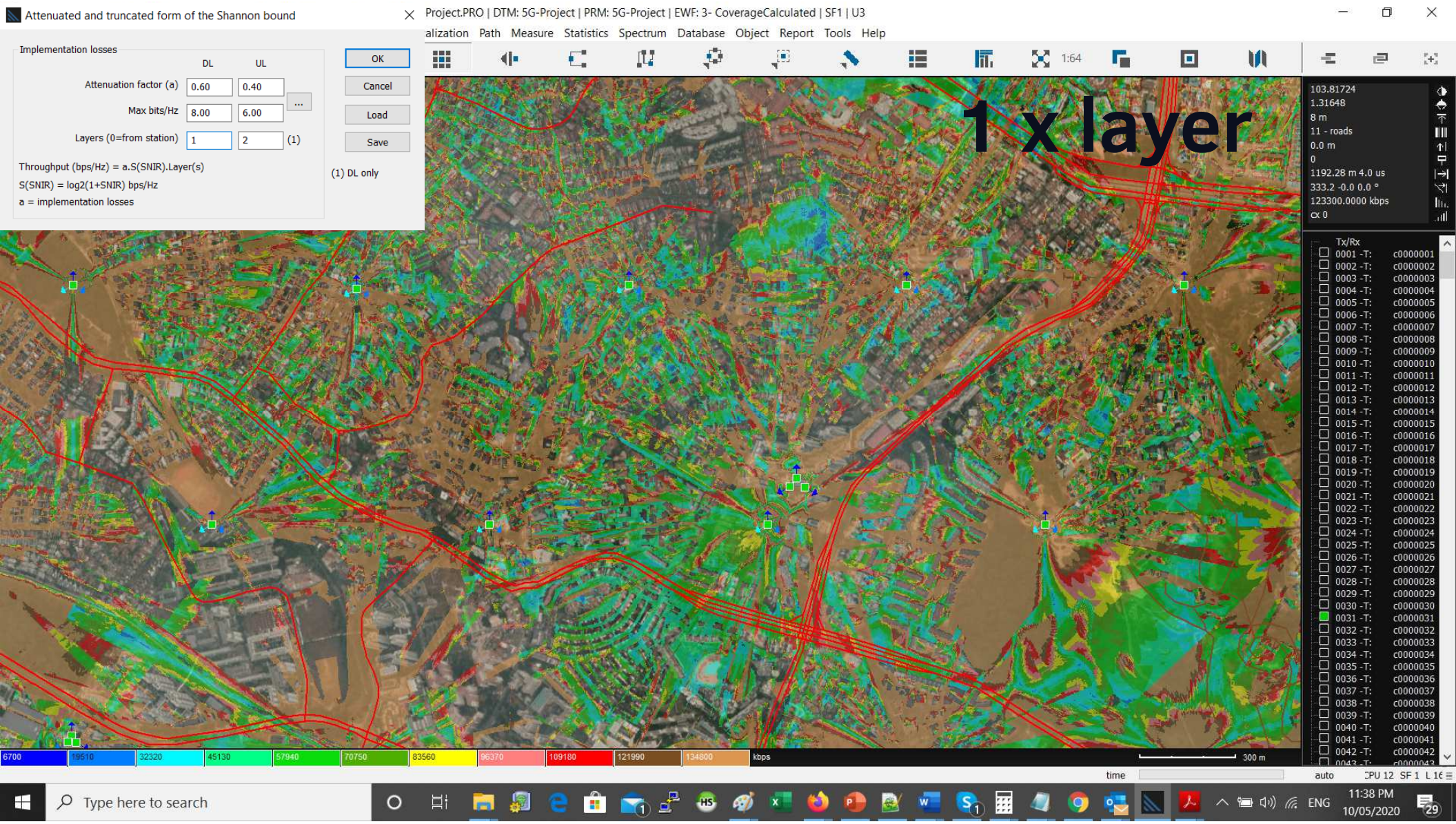
NR Throughput

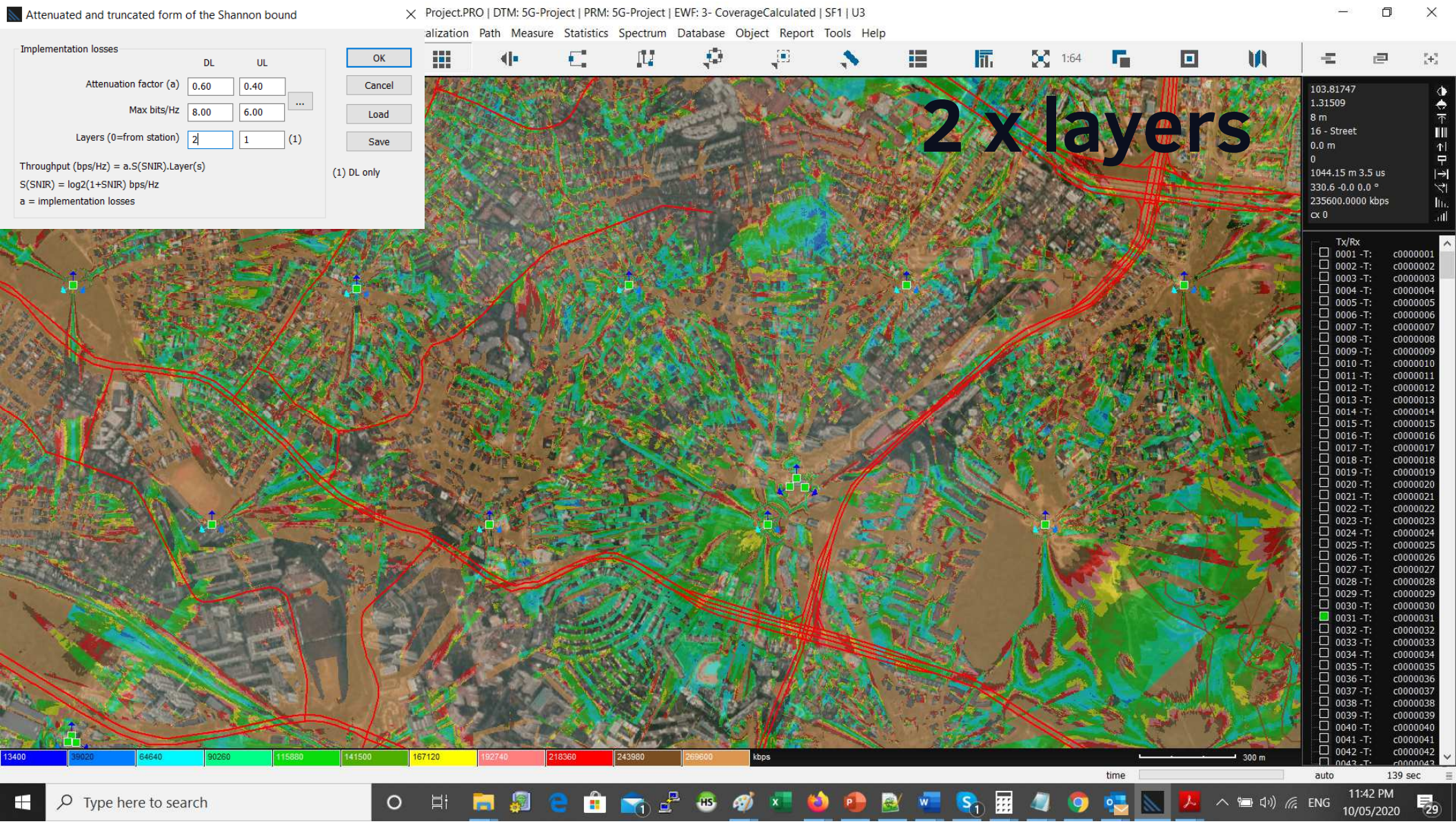
Massive MIMO

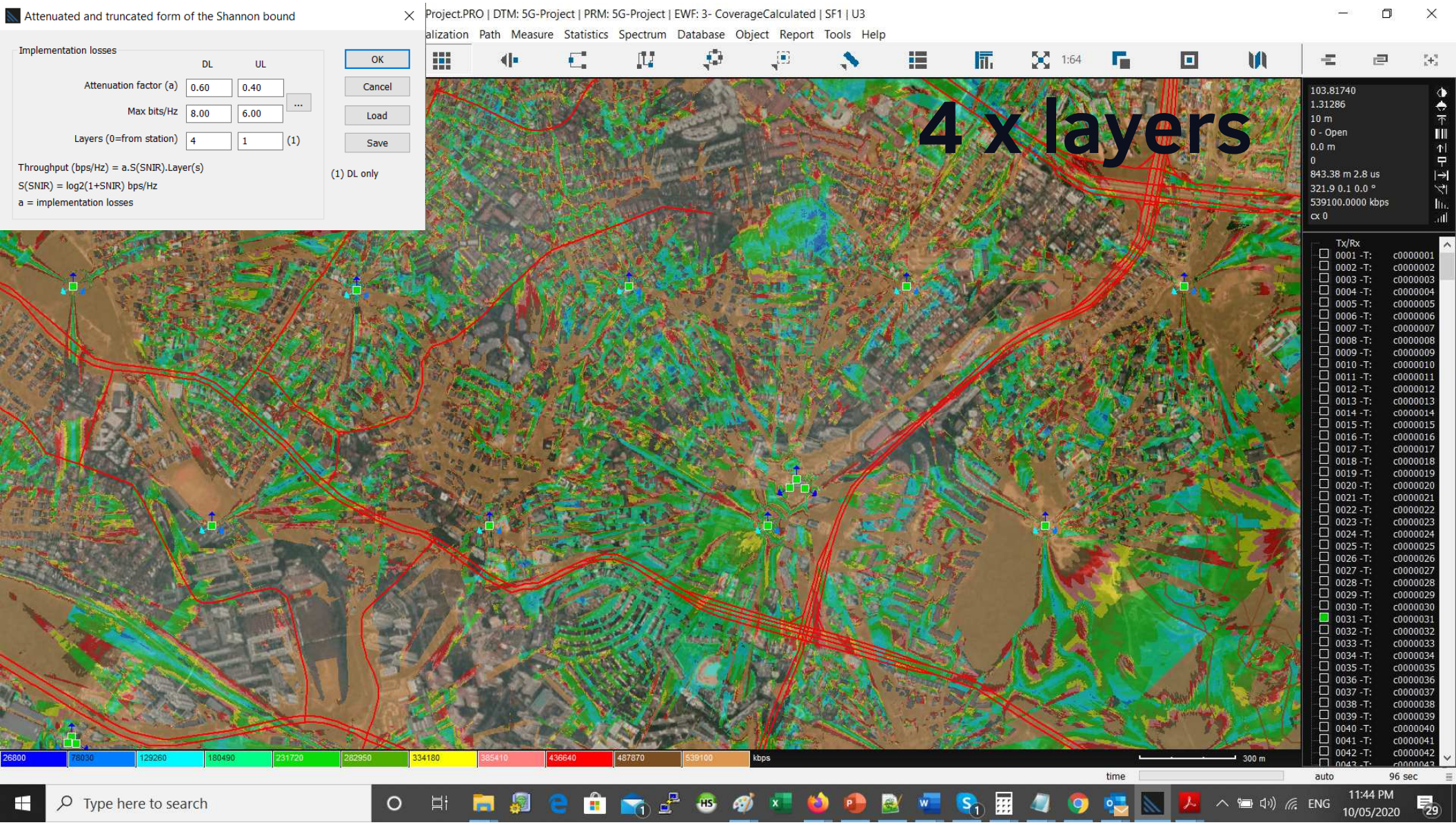
❑ **Massive MIMO configuration available**

- ➢ Beam-forming (traffic channels)
- ➢ Transmission diversity (spatial)
- ➢ Spatial multiplexing
- ➢ User multiplexing




Attenuated and truncated form of the Shannon bound
Implementation losses
DL
UL
Attenuation factor (a)
0.60
0.40
Max bits/Hz
8.00
6.00
Layers (0=from station)
1
2
(1)
Throughput (bps/Hz) = a.S(SNIR).Layer(s)
S(SNIR) = log2(1+SNIR) bps/Hz
a = implementation losses
OK
Cancel
Load
Save
(1) DL only
Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
alization Path Measure Statistics Spectrum Database Object Report Tools Help
1:64
1 x layer
103.81724
1.31648
8 m
11 - roads
0.0 m
0
1192.28 m 4.0 us
333.2 -0.0 0.0 °
123300.0000 kbps
cx 0
Tx/Rx
6700
19510
32320
45130
57940
70750
83560
96370
109180
121990
134800
kbps
300 m
time
auto

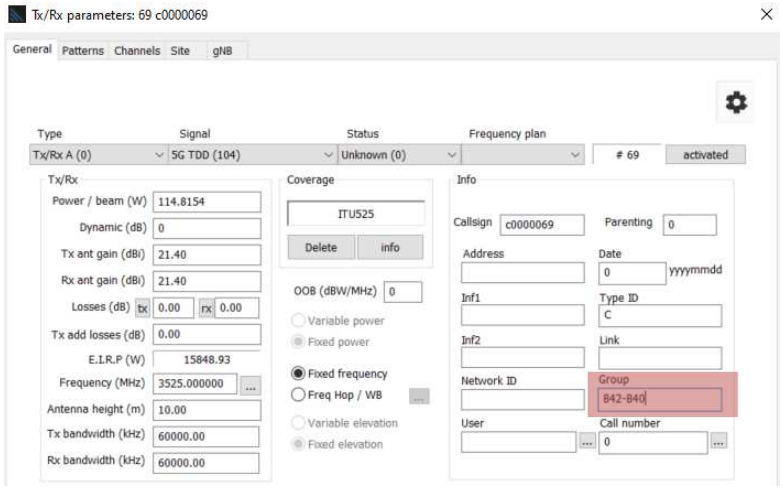

Attenuated and truncated form of the Shannon bound
Implementation losses
DL
UL
Attenuation factor (a)
0.60
0.40
Max bits/Hz
8.00
6.00
Layers (0=from station)
2
1
(1)
OK
Cancel
Load
Save
Throughput (bps/Hz) = a.S(SNIR).Layer(s)
S(SNIR) = log2(1+SNIR) bps/Hz
a = implementation losses
(1) DL only
Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
alization
Path
Measure
Statistics
Spectrum
Database
Object
Report
Tools
Help
1:64
2 x layers
103.81747
1.31509
8 m
16 - Street
0.0 m
0
1044.15 m 3.5 us
330.6 -0.0 0.0 °
235600.0000 kbps
cx 0
Tx/Rx
13400
39020
64640
90260
115880
141500
167120
192740
218360
243980
269600
kbps
300 m
time
auto
139 sec
Type here to search
ENG
11:42 PM
10/05/2020

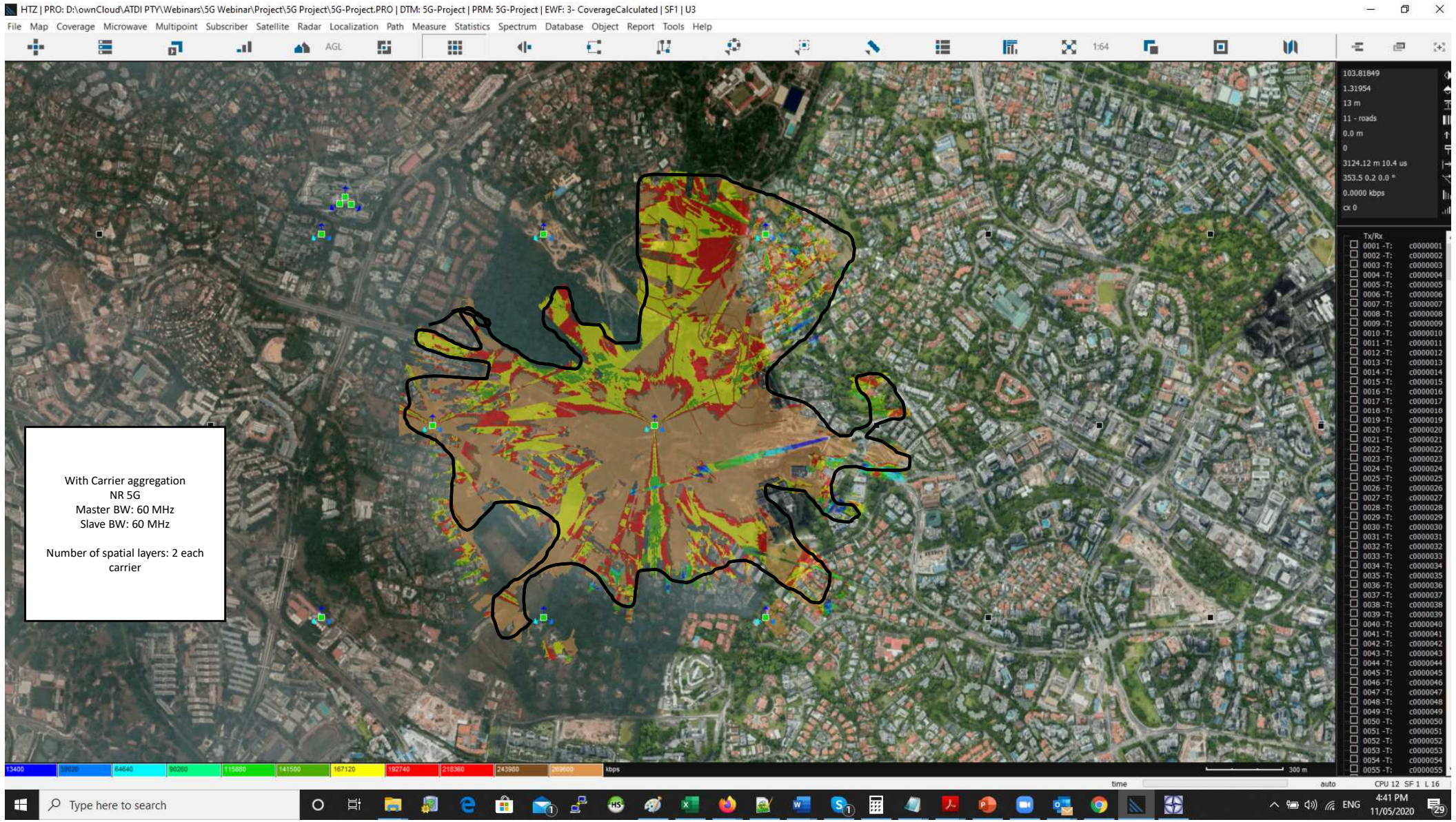

Attenuated and truncated form of the Shannon bound
Implementation losses
DL
UL
Attenuation factor (a)
0.60
0.40
Max bits/Hz
8.00
6.00
Layers (0=from station)
4
1
(1)
OK
Cancel
Load
Save
Throughput (bps/Hz) = a.S(SNIR).Layer(s)
S(SNIR) = log2(1+SNIR) bps/Hz
a = implementation losses
(1) DL only
Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
alization Path Measure Statistics Spectrum Database Object Report Tools Help
4 x layers
Tx/Rx
26800
78030
129260
180490
231720
282950
334180
385410
436640
487870
539100
kbps
300 m
time
auto
96 sec
Type here to search
ENG
11:44 PM
10/05/2020

Throughput

Multi-carrier aggregation

- **Massive MIMO configuration available**
  - Beam-forming (traffic channels)
  - Transmission diversity (spatial)
  - Spatial multiplexing
  - User multiplexing
- **Multi-carrier aggregation**
  - Master-slave relation-ship
  - Master sites, pilot channel checked
  - Slave sites, belong to same Group as master

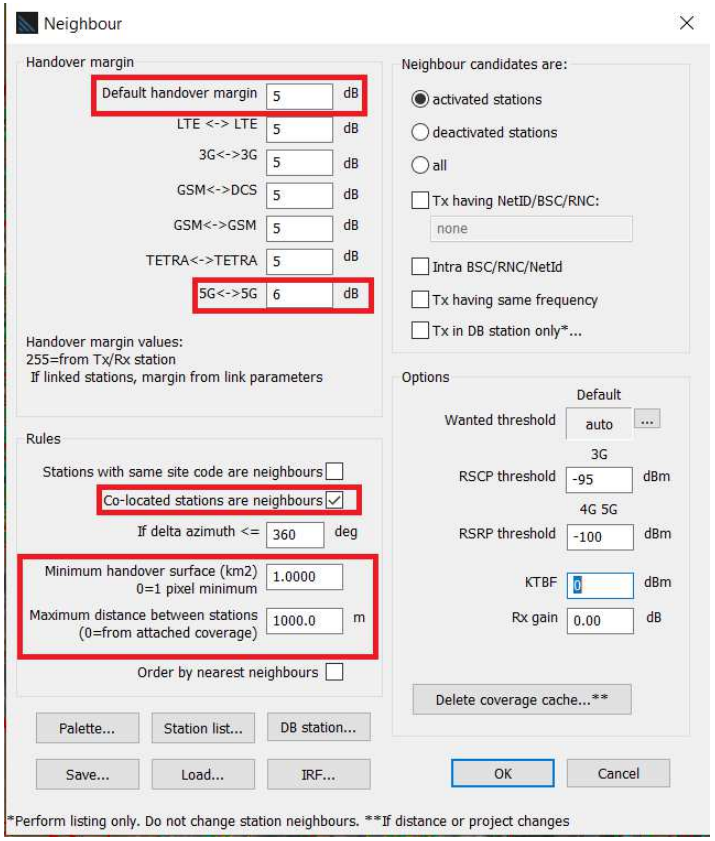


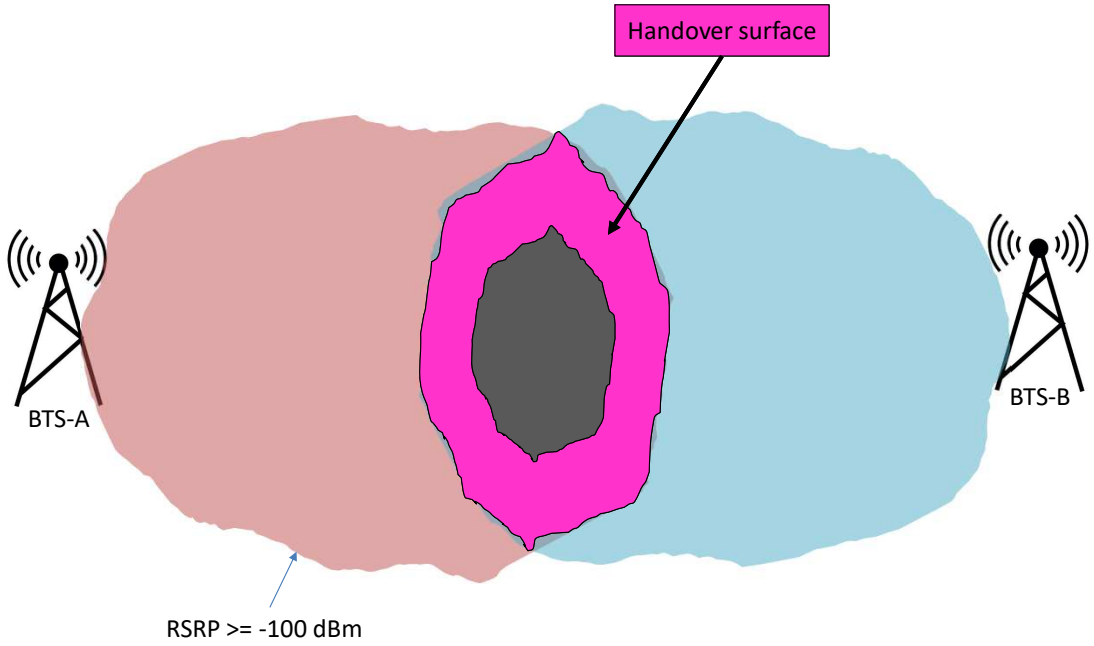

HTZ | PRO: D:\ownCloud\ATDI PTY\Webinars\5G Webinar\Project\5G Project\5G-Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
File Map Coverage Microwave Multipoint Subscriber Satellite Radar Localization Path Measure Statistics Spectrum Database Object Report Tools Help
With Carrier aggregation
NR 5G
Master BW: 60 MHz
Slave BW: 60 MHz
Number of spatial layers: 2 each carrier
kbps
300 m
Type here to search
ENG
4:41 PM
11/05/2020

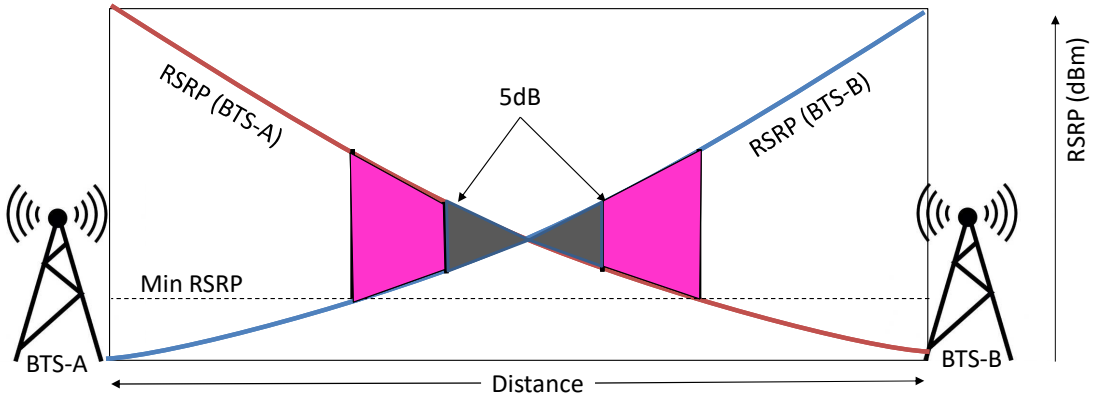
Neighbor planning

Auto Neighbor Planning

Neighbor map and neighbor list generation.

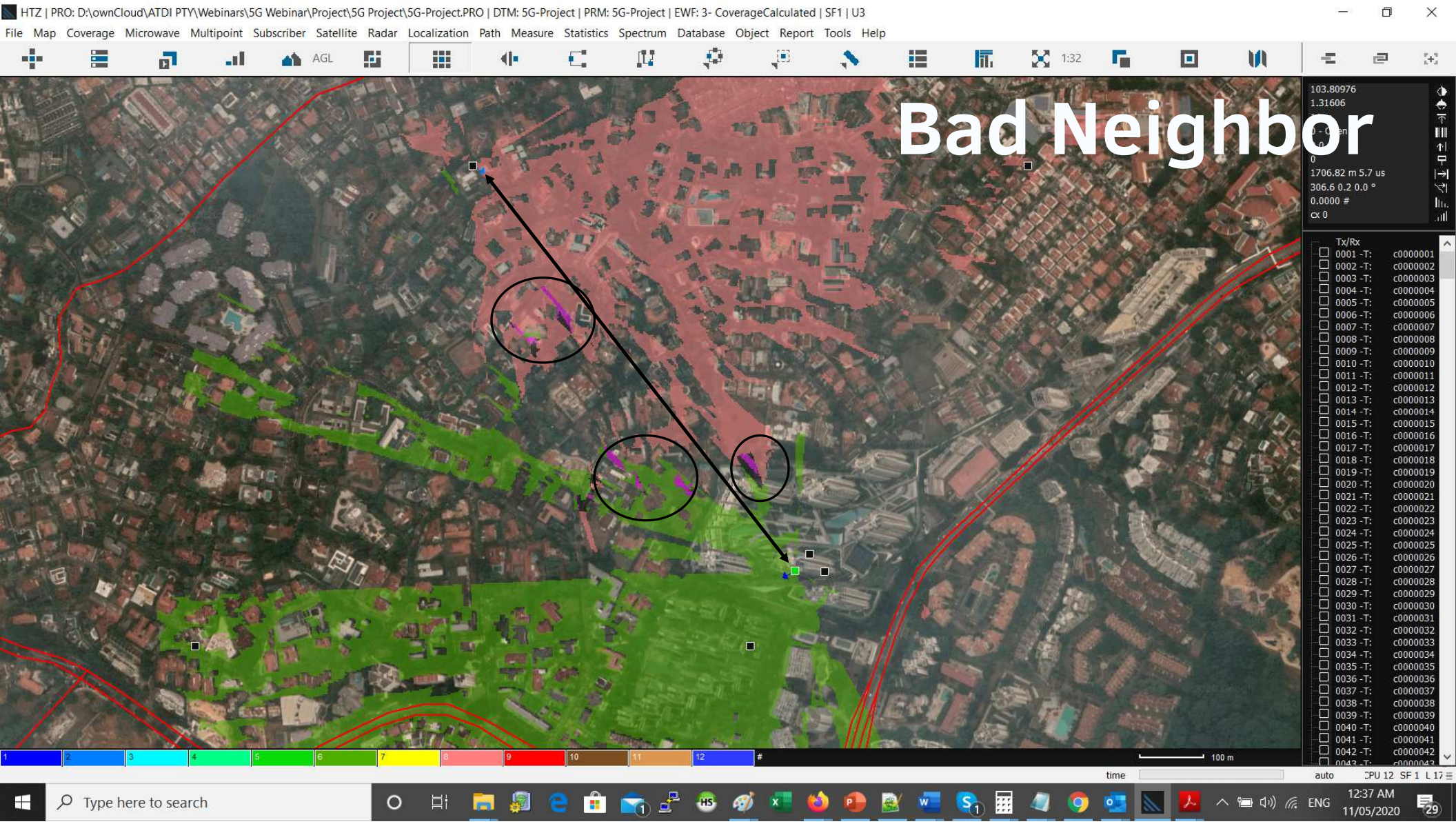


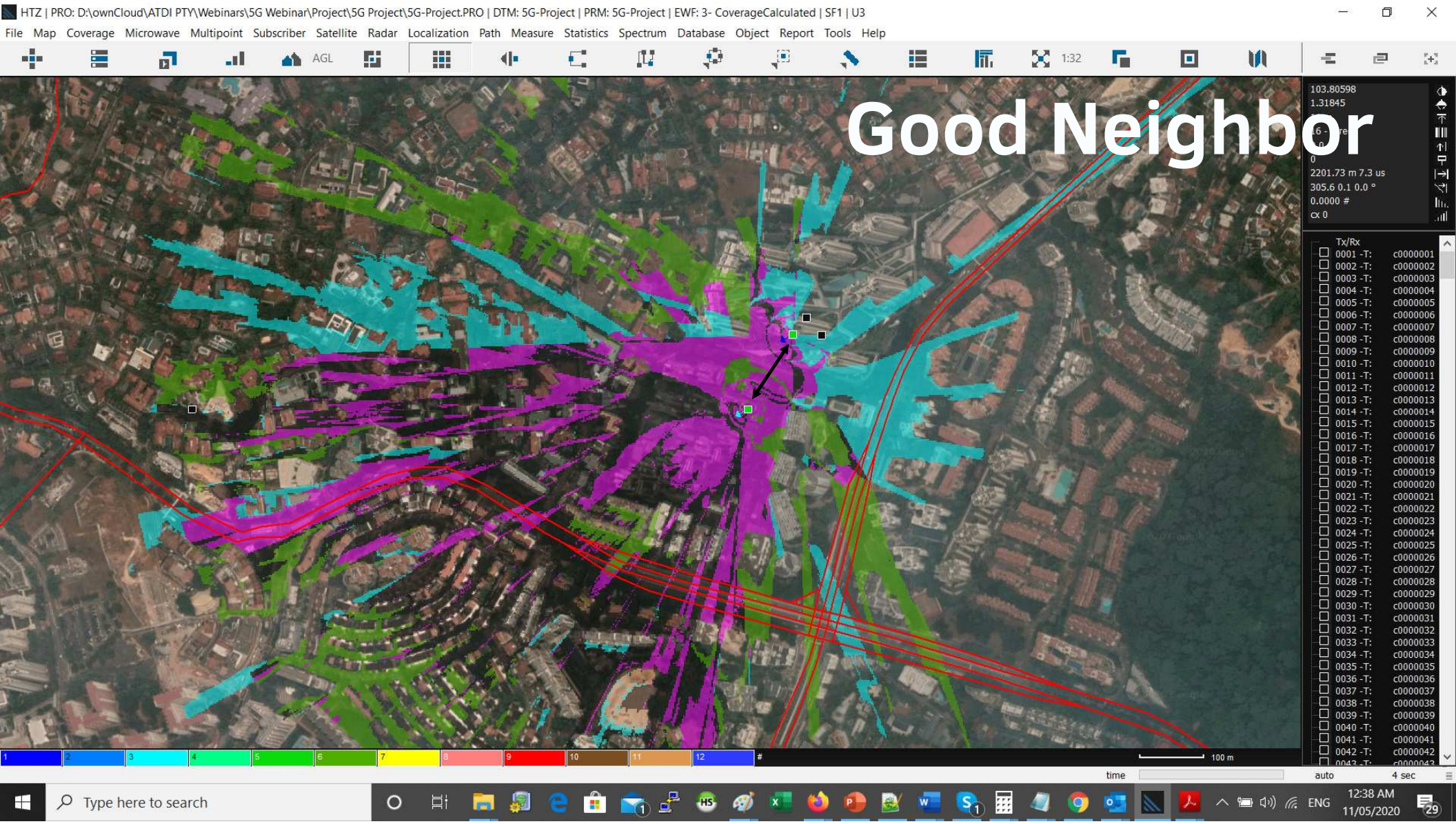


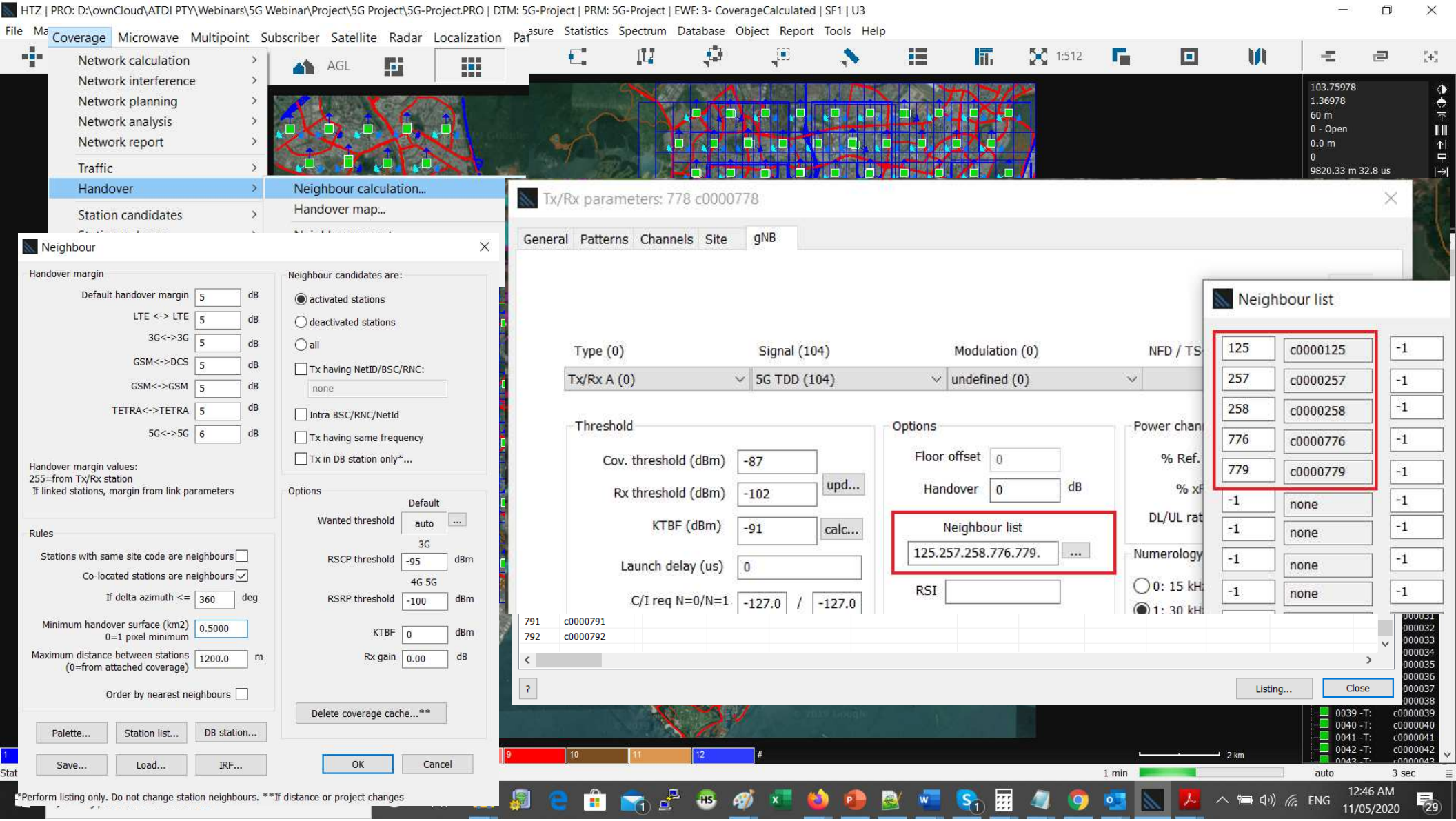


Handover area:

- RSRP_1 && RSRP_2 >= threshold &&
- |RSRP_1 – RSRP_2| >= 5dB


HTZ | PRO: D:\ownCloud\ATDI PTY\Webinars\5G Webinar\Project\5G Project\5G-Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
File Map Coverage Microwave Multipoint Subscriber Satellite Radar Localization Path Measure Statistics Spectrum Database Object Report Tools Help
Bad Neighbor
103.80976
1.31606
1706.82 m 5.7 us
306.6 0.2 0.0 °
0.0000 #
Tx/Rx
100 m
time
auto
Type here to search
ENG
12:37 AM
11/05/2020


HTZ | PRO: D:\ownCloud\ATDI PTY\Webinars\5G Webinar\Project\5G Project\5G-Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
File Map Coverage Microwave Multipoint Subscriber Satellite Radar Localization Path Measure Statistics Spectrum Database Object Report Tools Help
AGL
1:32
Good Neighbor
103.80598
1.31845
2201.73 m 7.3 us
305.6 0.1 0.0 °
0.0000 #
cx 0
Tx/Rx
0001 -T: c0000001
0002 -T: c0000002
0003 -T: c0000003
0004 -T: c0000004
0005 -T: c0000005
0006 -T: c0000006
0007 -T: c0000007
0008 -T: c0000008
0009 -T: c0000009
0010 -T: c0000010
0011 -T: c0000011
0012 -T: c0000012
0013 -T: c0000013
0014 -T: c0000014
0015 -T: c0000015
0016 -T: c0000016
0017 -T: c0000017
0018 -T: c0000018
0019 -T: c0000019
0020 -T: c0000020
0021 -T: c0000021
0022 -T: c0000022
0023 -T: c0000023
0024 -T: c0000024
0025 -T: c0000025
0026 -T: c0000026
0027 -T: c0000027
0028 -T: c0000028
0029 -T: c0000029
0030 -T: c0000030
0031 -T: c0000031
0032 -T: c0000032
0033 -T: c0000033
0034 -T: c0000034
0035 -T: c0000035
0036 -T: c0000036
0037 -T: c0000037
0038 -T: c0000038
0039 -T: c0000039
0040 -T: c0000040
0041 -T: c0000041
0042 -T: c0000042
1 2 3 4 5 6 7 8 9 10 11 12 #
100 m
time
auto
4 sec
Type here to search
ENG
12:38 AM
11/05/2020


HTZ | PRO: D:\ownCloud\ATDI PTY\Webinars\5G Webinar\Project\5G Project\5G-Project.PRO | DTM: 5G-Project | PRM: 5G-Project | EWF: 3- CoverageCalculated | SF1 | U3
File Coverage Microwave Multipoint Subscriber Satellite Radar Localization Statistics Spectrum Database Object Report Tools Help
Network calculation
Network interference
Network planning
Network analysis
Network report
Traffic
Handover
Station candidates
Neighbour calculation...
Handover map...
Neighbour
Handover margin
Default handover margin 5 dB
LTE <-> LTE 5 dB
3G<->3G 5 dB
GSM<->DCS 5 dB
GSM<->GSM 5 dB
TETRA<->TETRA 5 dB
5G<->5G 6 dB
Handover margin values:
255=from Tx/Rx station
If linked stations, margin from link parameters
Rules
Stations with same site code are neighbours
Co-located stations are neighbours
If delta azimuth <= 360 deg
Minimum handover surface (km2) 0.5000
0=1 pixel minimum
Maximum distance between stations 1200.0 m
(0=from attached coverage)
Order by nearest neighbours
Neighbour candidates are:
activated stations
deactivated stations
all
Tx having NetID/BSC/RNC:
none
Intra BSC/RNC/NetId
Tx having same frequency
Tx in DB station only*...
Options
Default
Wanted threshold auto
3G
RSCP threshold -95 dBm
4G 5G
RSRP threshold -100 dBm
KTBF 0 dBm
Rx gain 0.00 dB
Delete coverage cache...**
Palette... Station list... DB station...
Save... Load... IRF...
OK Cancel
*Perform listing only. Do not change station neighbours. **If distance or project changes
Tx/Rx parameters: 778 c0000778
General Patterns Channels Site gNB
Type (0) Signal (104) Modulation (0) NFD / TS
Tx/Rx A (0) 5G TDD (104) undefined (0)
Threshold
Cov. threshold (dBm) -87
Rx threshold (dBm) -102 upd...
KTBF (dBm) -91 calc...
Launch delay (us) 0
C/I req N=0/N=1 -127.0 / -127.0
Options
Floor offset 0
Handover 0 dB
Neighbour list
125.257.258.776.779. ...
RSI
Power chan
% Ref.
% xP
DL/UL rat
Numerology
0: 15 kH
1: 30 kH
791 c0000791
792 c0000792
Listing... Close
Neighbour list
125 c0000125 -1
257 c0000257 -1
258 c0000258 -1
776 c0000776 -1
779 c0000779 -1
-1 none -1
-1 none -1
-1 none -1
-1 none -1
-1 none -1
0039 -T: c0000039
0040 -T: c0000040
0041 -T: c0000041
0042 -T: c0000042
103.75978
1.36978
60 m
0 - Open
0.0 m
0
9820.33 m 32.8 us
1 min
2 km
auto
3 sec
ENG
12:46 AM
11/05/2020

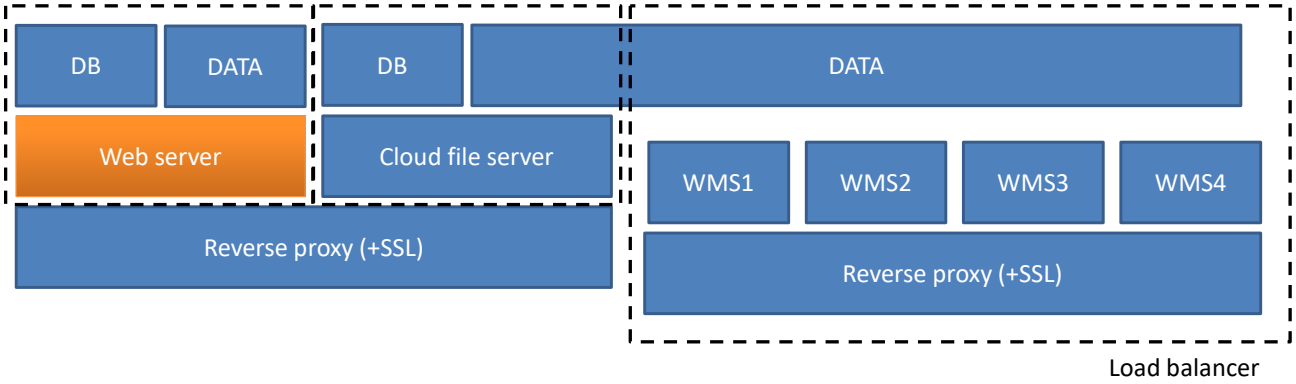
Coverage on the web

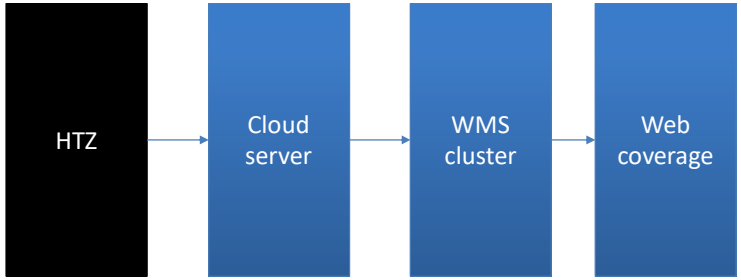
Online or intranet coverage publishing

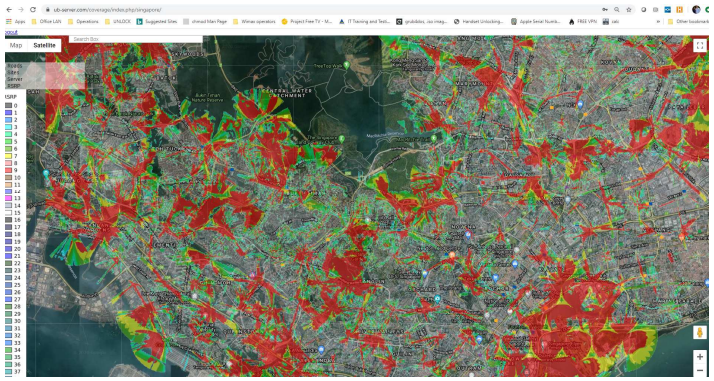
WMS service

WEBINAR 5G Technology | 2020

Coverage on the web







ATDI

Sydney(APAC)

+61 298 897 306
12A, 33 Waterloo Road,
Macquarie Park NSW 2113

Paris

+33 1 53 30 81 41
11 Boulevard Malesherbes
75008 Paris – France

Other offices

Poland, England, Spain,
Russia, Israel, Ukraine,
Latin America, Germany

https://atdi-group.com/contact/

HQ ADDRESS

11 Boulevard Malesherbes
75008 Paris – France

PHONE NUMBER

+33 1 53 30 81 41

E-MAIL ADDRESS

contact@atdi-group.com
sales@atdi-group.com
support@atdi-group.com