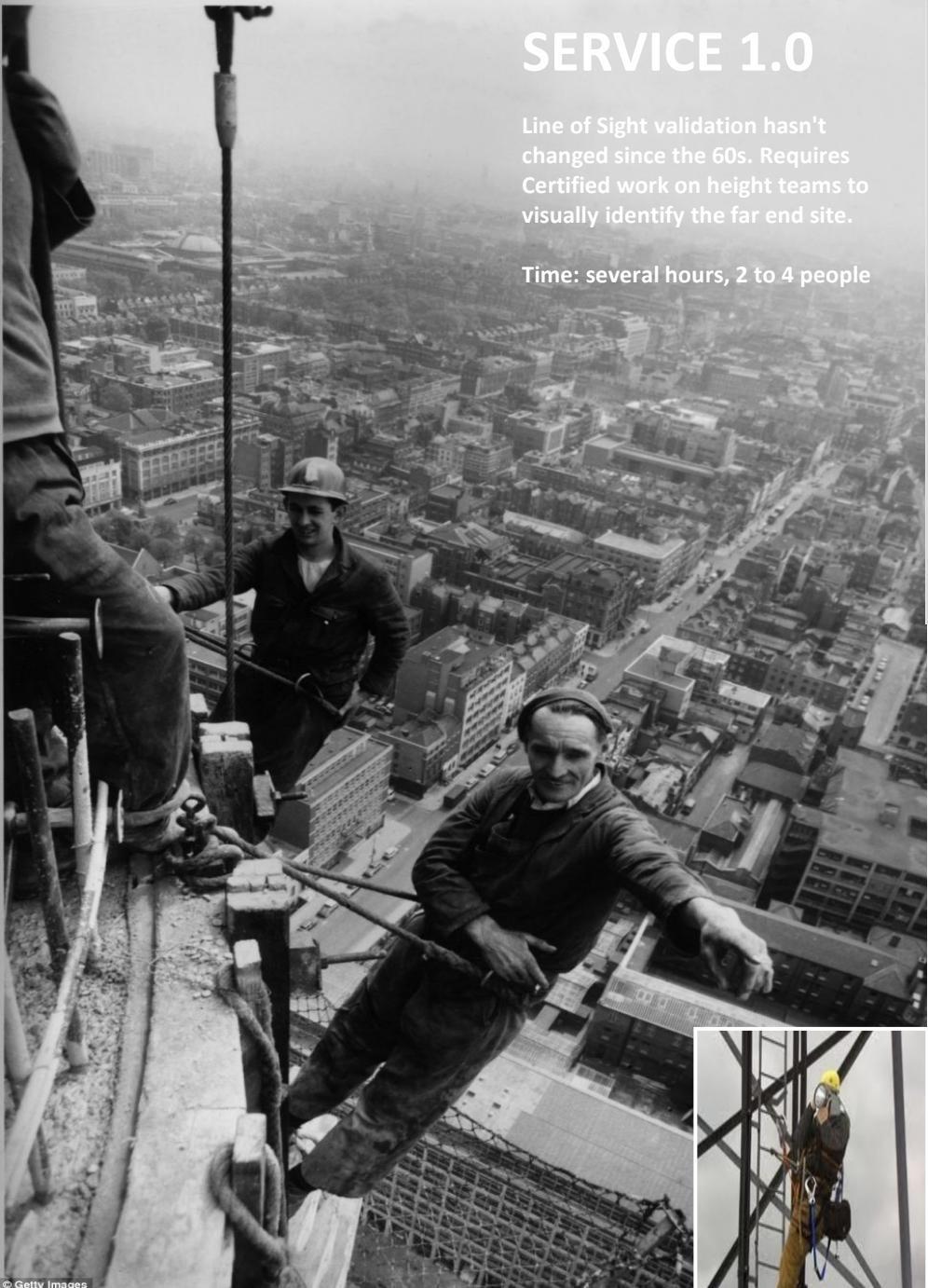




TelcoDrone™

Enhancing Telecom Operations

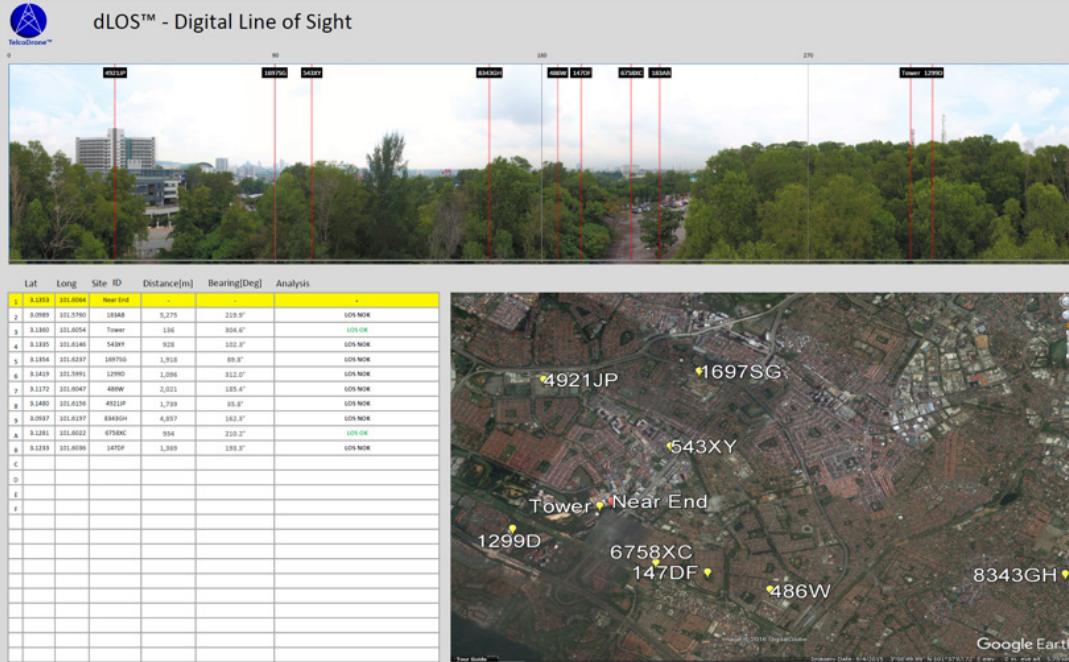




SERVICE 1.0

Line of Sight validation hasn't changed since the 60s. Requires Certified work on height teams to visually identify the far end site.

Time: several hours, 2 to 4 people



SERVICE 2.0 Line of Sight

dLOS™. Digital Line of Sight

360 panorama photos, drone data sensors and Site Location database, are elaborated and combined together to precisely highlight, in one view, all the possible sites in line of sight, saving multiple visits and time.

Time: 1 hr, 1 Drone operator only.

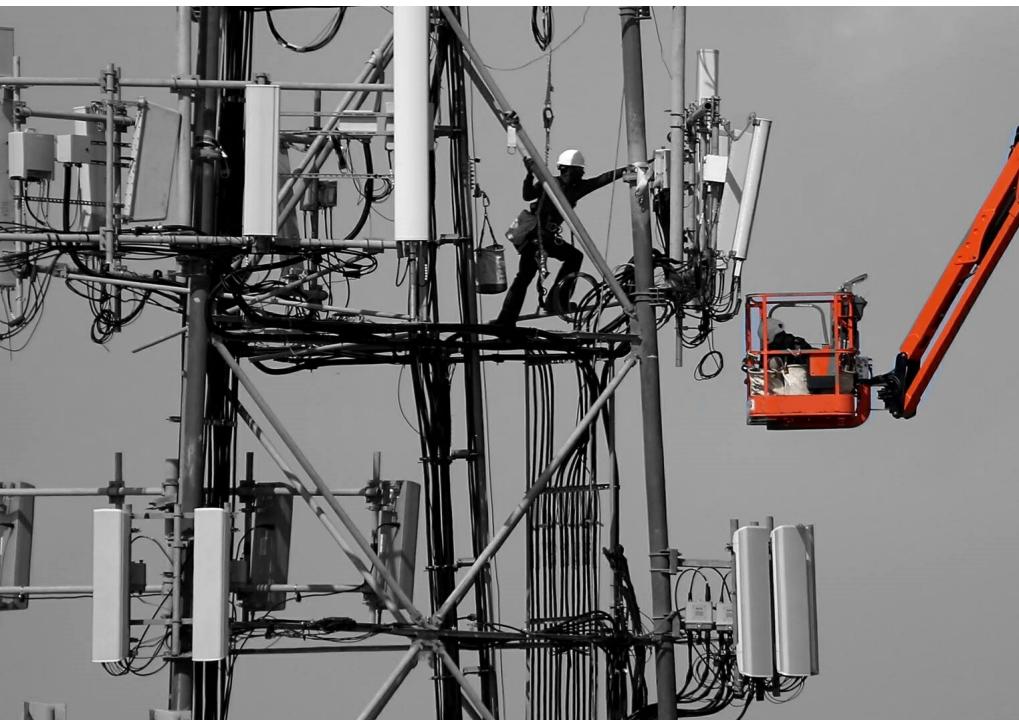


" A Mobile Operator, performs between 1000 to 2000 Line of Sight a year "

SERVICE 1.0

Site Acquisition. LOS , Frequency Scan and ideal height study for new towers, require expensive aerial platforms and road access permits.

Planning and implementing this activity require days and a team of 4 people, at least.



SERVICE 2.0 Acquisition

Site Acquisition and Studies.

Arial Video with telemetry for line of sight and RF Scan can be done in a matter of minutes. No crane or cherry picker is required.

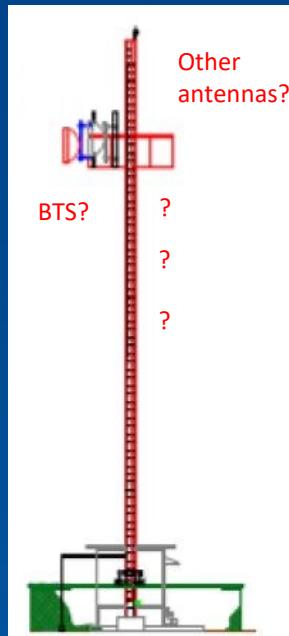
Only 1 operator is required.

“ In a growing network, location Analysis and RF Scan is fundamental for new implementations. “

SERVICE 1.0

Audits are limited to 'on demand scope of work' (i.e. a new link) resulting in a limited and poor documentation.

Multiple visits and several documents are required to properly assess a telecom site.



TIPS:

- Use the below shortcuts to sync views between the photos and 3D model
- On photos, use the menu bar to zoom in and out, hold to pan, move back and forward
- Open Measuring Tools to measure details on the 3D modeling

VIEWS	DIRECTION
IsoView	0° 30°
TopView	60° 90°
FrontView	120° 150°
LeftView	180° 210°
RightView	240° 270°
RearView	300° 330°

SITE NAME	
TD0001 - Pole Tower	
SITE ADDRESS	
Trial - Malaysia	
TITLE	DATE
Outdoor 3D View	23/09/2016
DRAWN BY	CHECK BY
Michael F.	Danny C.
Customer Logo	

SERVICE 2.0 Audit

3D Outdoor and HD photos.

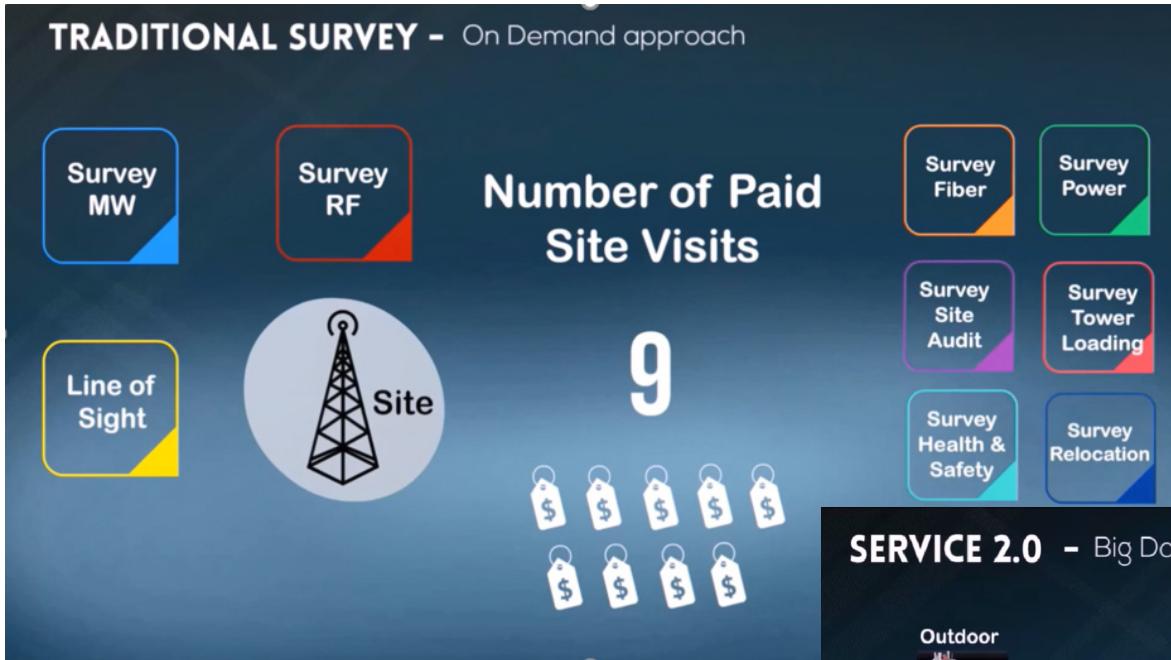
Elaborating aerial photos and sensors data, we are able to provide an accurate **workable** 3D model and HD photos, representing the real site condition, **in one visit**.

360 Indoor view completes the site audit.

" A Mobile Operator, continuously audit its network, on average 10.000 to 20.000 Sites "



Business Model



Play Video

SERVICE 2.0 - Big Data approach



Big Data. The key for cost/time efficiency in Telecom operations.

The traditional model is based “on demand” approach which common activities are repeated for any single request (i.e. a site visit for each type of survey)

Our products have been designed to collect all possible information **in one single site visit***, creating a comprehensive set of data that can be used, at any time, **for multiple studies** and by cross-disciplinary group of experts

*Data acquisition procedure can be tailored for specific survey requirements.



TelcoDrone™

Outdoor

Advanced Assessment
Documentation



TelcoDrone™

Workable 3D model and detailed HD Photos

The multimedia PDF format, enables measurements and photo analysis for a comprehensive tower assessment and Engineering Tool.

Play Video

FrontView

TIPS:

- Use the below shortcuts to sync views between the photos and 3D model
- On photos, use the menu bar to zoom in and out, hold to pan, move back and forward
- Open Measuring Tools to measure details on the 3D modeling

VIEWS

IsoView

TopView

FrontView

LeftView

RightView

RearView

DIRECTION

0° 30°

60° 90°

120° 150°

180° 210°

240° 270°

300° 330°

SITE NAME

TD0001 - Pole Tower

SITE ADDRESS

Trial -Malaysia

TITLE

Outdoor 3D View

DATE

23/09/2016

DRAWN BY

Michael F.

CHECK BY

Danny C.

Customer
Logo

TIPS:

- Use the below shortcuts to sync views between the photos and 3D model
- On photos, use the menu bar to zoom in and out, hold to pan, move back and forward
- Open Measuring Tools to measure details on the 3D modeling

VIEWS	DIRECTION	SITE NAME
IsoView	0° 30°	TD0001 - Pole Tower
TopView	60° 90°	SITE ADDRESS
FrontView	120° 150°	Trial -Malaysia
LeftView	180° 210°	TITLE
RightView	240° 270°	Outdoor 3D View
RearView	300° 330°	DATE

Customer Logo

TelcoDrone™

1. Measure heights and size of any object on the tower
2. Can Plan and re-mark new installation directly on 3D model view
3. Photos can zoom in and out for view details and sync with the 3D model view
4. PDF can view and share to anyone using the *freeware version of Adobe Acrobat Reader*

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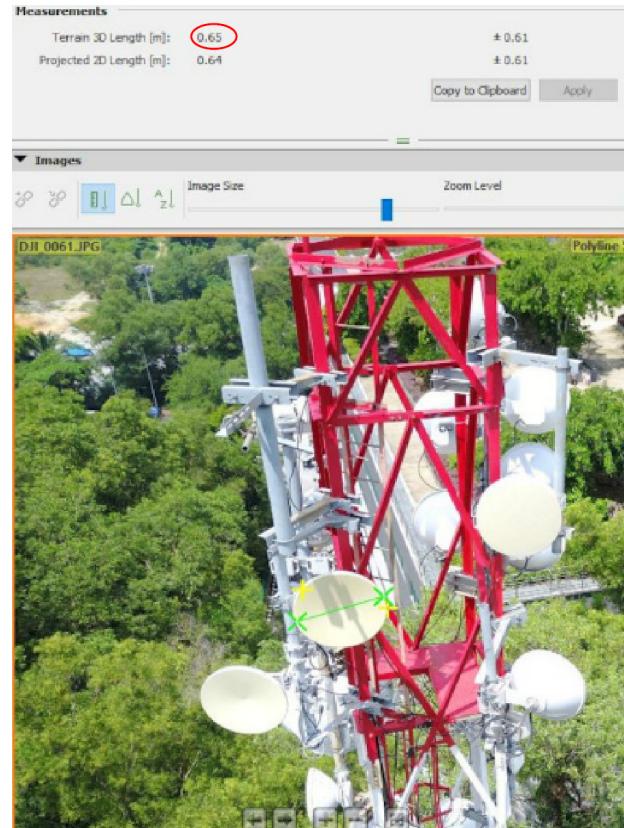
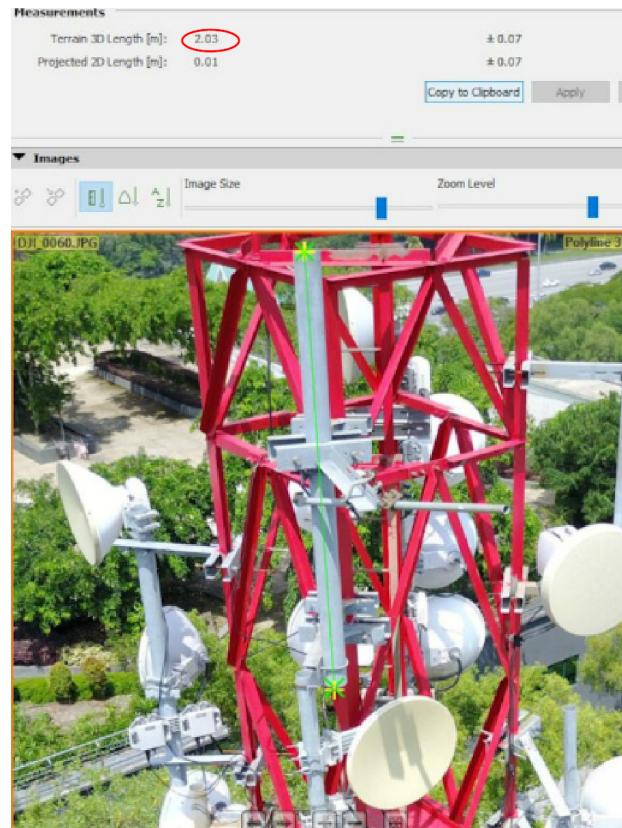
7



TelcoDrone™

Untouchable Precision

Elaborating aerial images, we are able to precisely measure any visible element of the structure, without claiming or even access the site.



Outputs

- Cloud points (densified and classified)
- 3D Object
- Orthomosaic and DSM
- Adobe Acrobat Reader PDF

Compatible Software

- Google Maps and Google Earth
- AutoCad
- MeshLab
- Global Mapper
- ArcGIS
- Quantum GIS



Play Video
(Drone Flight)



Unmanned on heights survey

New installation, quality check, initial trouble shooting no longer requires man on heights hazard, dramatically decrease the risk of a fatal incident or serious injuries

WEST



NORTH



EAST



SOUTH





BTS Tilt and Azimuth verification

Elaborating together the photos and sensors data collected by the drone, it is possible to accurately measure the tilt and azimuth of sector antennas for optimization proposed. Quick, safe and reliable.



TILT : 10.59°



Azimuth: 137° *(looking at)
(Calculated with dLOS™ BTS)

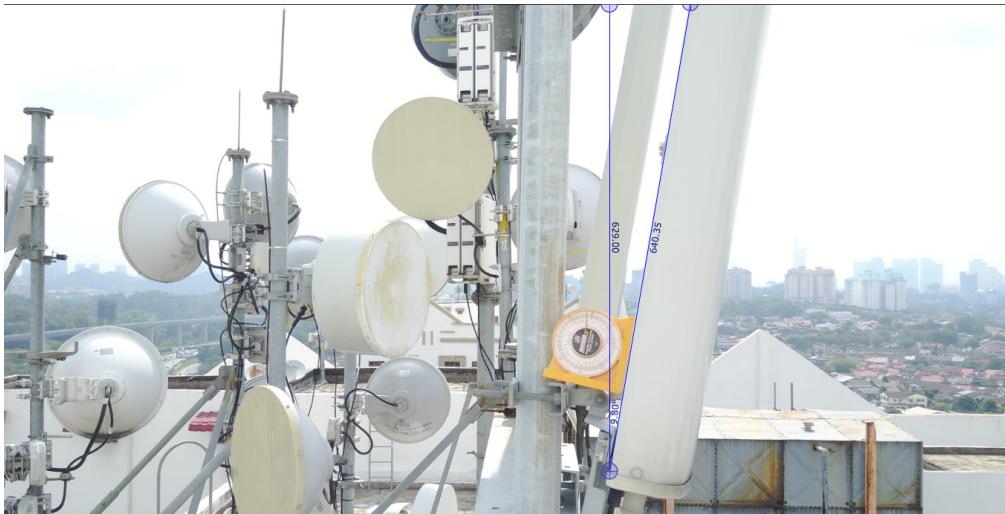
Notes:

Tilt and Azimuth have been calculated using the Drones
Gyro, GPS and Magnetic sensors



BTS Tilt and Azimuth verification: PoC

Comparing traditional measurement with a gravity inclinometer, placed manually behind the Sector antenna, and with UAV. The difference is only 0.2deg



TILT : $9.8^\circ (\pm 0.5^\circ)$ with UAV (drone)



TILT : 10° with gravity inclinometer

Notes:

The UAV measurement matches ($\pm 0.5^\circ$) with the traditional measurement process with the inclinometer tool.

No more climbing or Skylift are required to check the Tilt and Azimuth of sector antennas.



TelcoDrone™

Enhanced Google Earth Resolution

High resolution orthomosaic model is provided as .kml file which precisely overly on the site position, improving the quality and accuracy of the survey



Orthomosaic Tiles for Google Earth to enhance mapping details where not available



Original from Google Earth



Enhanced



TelcoDrone™

Indoor

Comprehensive Data Collection



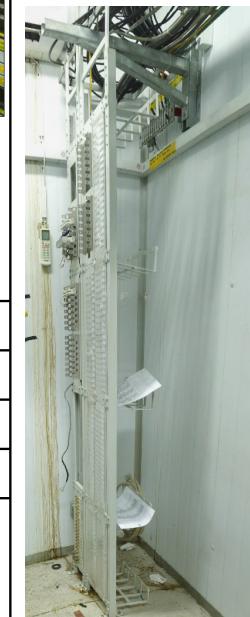
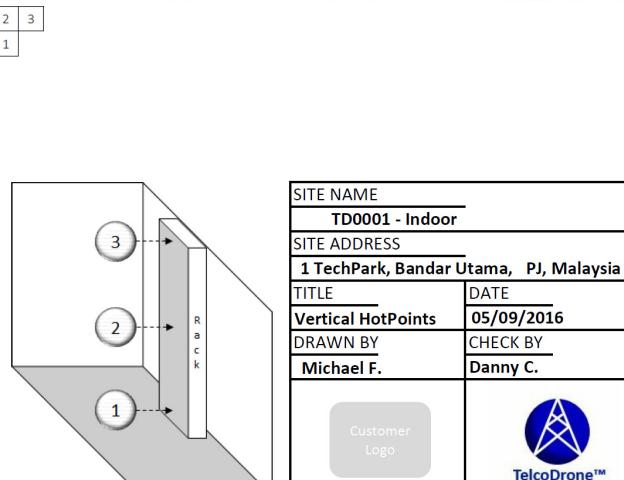
TelcoDrone™

Indoor 360x180 View

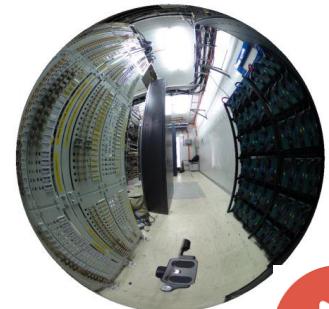
One survey for all purpose



1. HD spherical photos allows to view details at label level, with one single shot. Each photo can pan and zoom to view any details.



2. To be dismantle...
the 360x180 allows to capture information useful for other purpose, such dismantling, cabling, site conditions, available space, H&S tools, etc.. avoiding multiple visits



Play Video



TelcoDrone™

Line of Sight

Computerized Analysis Tool



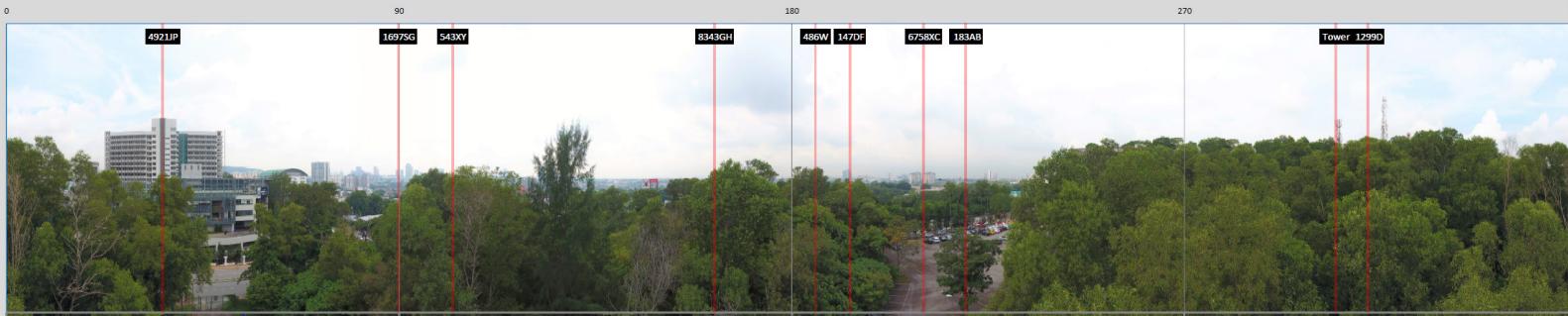
TelcoDrone™

dLOS™ : Digital line of sight analysis tool

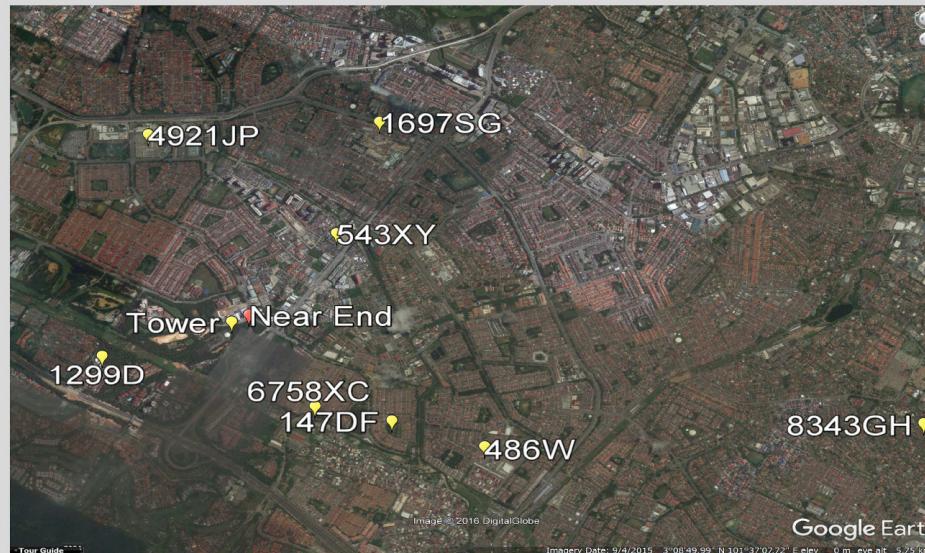
The panoramic photo represents the 360 view from the tower top or at the nominal height of a new antenna location



dLOS™ - Digital Line of Sight



Lat	Long	Site ID	Distance[m]	Bearing[Deg]	Analysis
1	3.1353	101.6064	Near End	-	-
2	3.0989	101.5760	183AB	5,275	219.9° LOS NOK
3	3.1360	101.6054	Tower	136	304.6° LOS OK
4	3.1353	101.6146	543XY	928	102.3° LOS NOK
5	3.1354	101.6237	1697SG	1,918	89.8° LOS NOK
6	3.1419	101.5991	1299D	1,096	312.0° LOS NOK
7	3.1172	101.6047	486W	2,021	185.4° LOS NOK
8	3.1480	101.6156	4921JP	1,739	35.8° LOS NOK
9	3.0937	101.6197	8343GH	4,857	162.3° LOS NOK
A	3.1281	101.6022	6758XC	934	210.2° LOS OK
B	3.1233	101.6036	147DF	1,369	193.3° LOS NOK
C					
D					
E					
F					



How it works:

We elaborate the photos take by the drone, or manually, into a 360° panoramic view automatically interpolate the far end sites coordinate within the view.

Google Earth and .KLM file is also created and available on the final pdf report



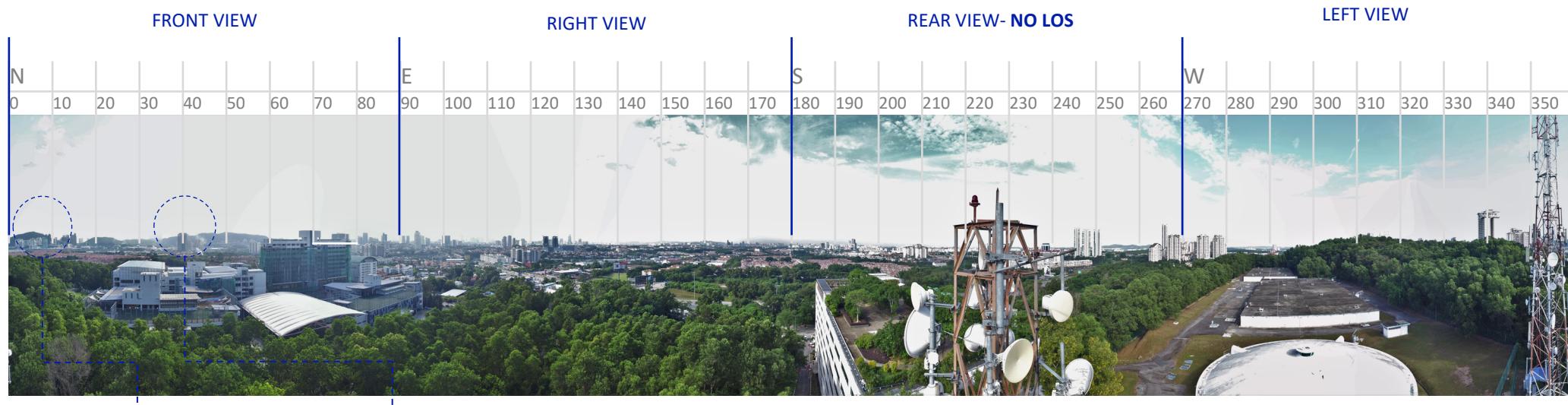
Play Video

SITE NAME TD003- Site Acquisition	CUSTOMER LOGO	Powered By: TelcoDrone™
TITLE Trial Site - Cells on wheels	DATE 1/12/2016	
DRAWN BY Michael F.	CHECK BY Danny C.	

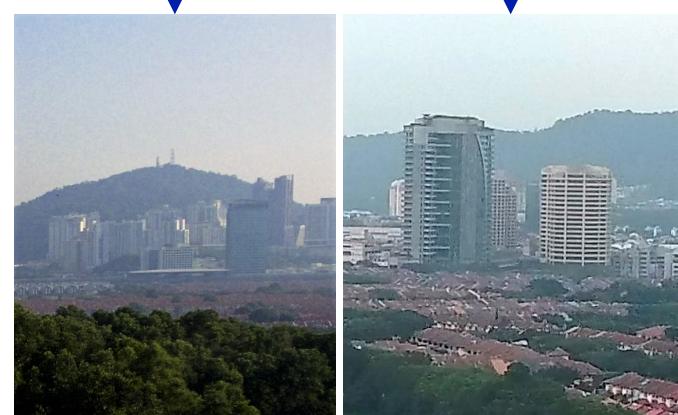


New candidate identification

The High Definition photo, allows the planner to zoom and identify new far end candidates in line of sight. Direction and distance will be determinate with the support of dLOS analysis tool

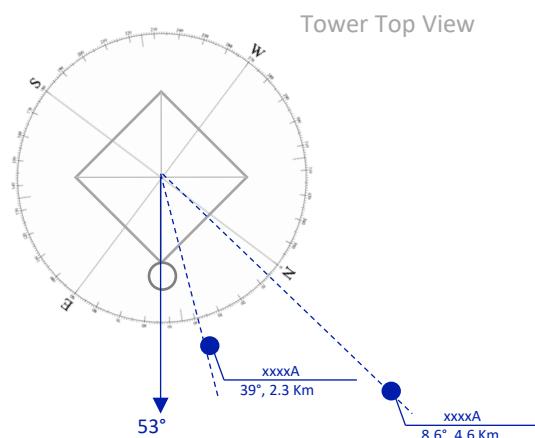


Proposed Far End
Sites



Site xxxxA

Site xxxxB



Tower Top View

The above 360 photo represents the panoramic view from a proposed antenna position. All directions and potential far end candidates are visible and highlighted.



Site Acquisition

Eagle Eye Technique



TelcoDrone™

Site Survey for Acquisition Purpose (with or without a tower)

Location Coordinates, Bearing, Altitude reference are all embedded in a 360 video taken by a professional UAS (Drone), avoiding expensive rental of cherrypicker and access permission.



Play Video

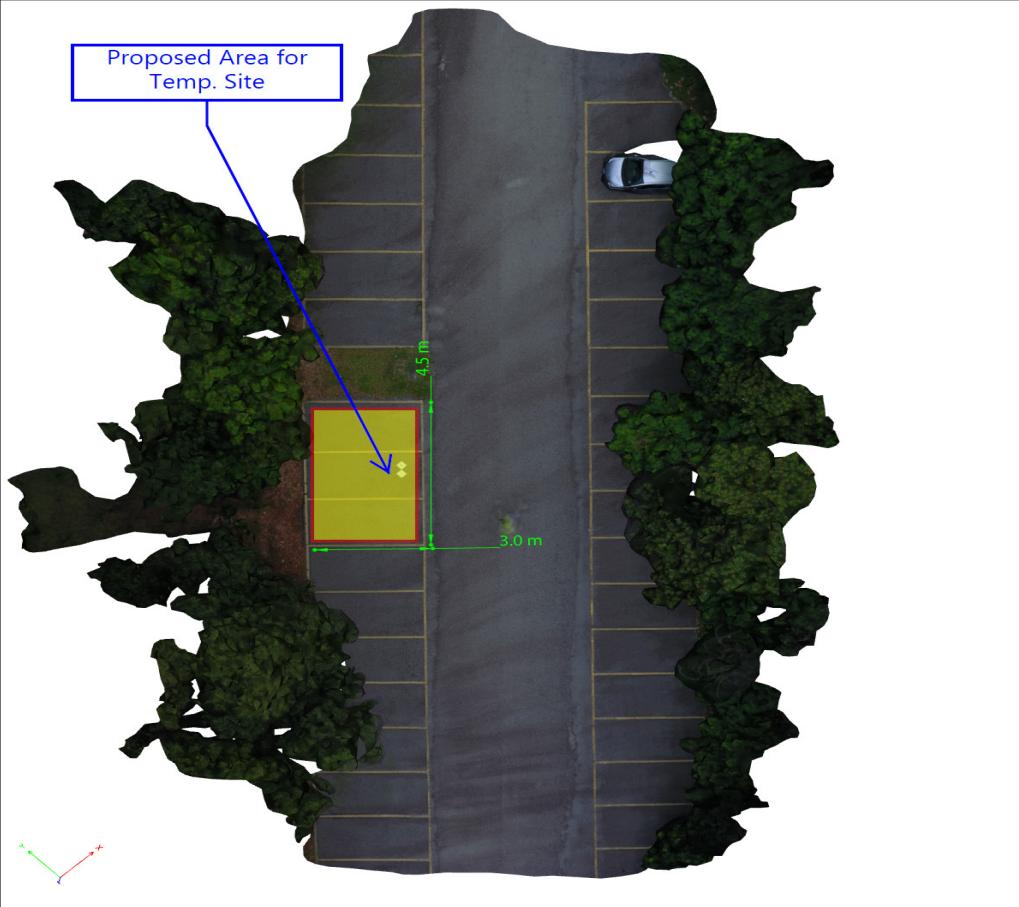




TelcoDrone™

Site Survey for Acquisition Purpose

Workable 3D modeling of the site candidate to accurately evaluate the area



A 3D perspective map of a parking lot surrounded by trees. A yellow rectangular area is highlighted and labeled "Proposed Area for Temp. Site". A blue arrow points from this label to the highlighted area. Dimensions are indicated: width 4.5m and depth 3.0m. A coordinate system with red, green, and blue axes is shown in the bottom left corner.

EXAMPLE OF SITE SURVEY FOR TEMPORARY MOBILE TELCOM
TOWER INSTALLATION. (CoW Site)

3D VIEW AND HIGH RESOLUTION PHOTOS



An aerial photograph of the same parking lot and surrounding trees. A small white car is parked in the top center of the lot. The yellow rectangular area from the 3D map is visible on the ground.

VIEWS

[IsoView](#)
[TopView](#)
[FrontView](#)
[LeftView](#)
[RightView](#)
[RearView](#)

SITE NAME	
TD003- Site Site	
SITE ADDRESS	
Trial Site - Cells on wheels	
TITLE	
3D model	DATE
	05/09/2016
DRAWN BY	
Michael F.	CHECK BY
Danny C.	

 Customer Logo

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Thank You

