Using Dedicated TDD Spectrum to build Dedicated TD-LTE Network for Vertical Industries

By

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5G is becoming a NETWORK of Networks of many different frequency spectrum bands

TDD Spectrum are readily available and easy to allocate as does not need spectrum pairing and have being used to deploy 4G and Wireless To The Premises by many of our GTI operator members

Besides serving the ever growing Mobile Data Network using TD-LTE, 5G can use TD-LTE to serve Vertical Industries that require short latency, more upload to download ratio and high QOS requirements

AreteM is proposing to utilize Un-used TDD frequency spectrum in Singapore to build Dedicated LTE Network as Mission Critical Communication Networks to serve Vertical Industries.

1.79GHz - 1.80 Ghz TDD LTE System

- The 1.785GHz to 1.805GHz is the central Guard Band for GSM deployment in Band 3
- Many countries had re-farmed GSM Band 3 for FDD-LTE deployment
- With proven RF Network design and engineering techniques, AreteM is using the central 10MHz band to deploy Dedicated TD-LTE Network to serve vertical industries

Dedicated LTE using 1.79GHz – 1.80GHz
A New Industrial Mission Critical Communication Network

Mission Critical Mobile Data

- Mission Critical Grade TD-LTE
- Uses 1.79GHz – 1.80GHz band to support multiple Core Networks
- Dedicated Mission Critical applications with low latency, guarantee QOS and free from interference.

Wi Fi

- Using the 1.8GHz dedicated TD-LTE as backhaul connection, multiple Portable WiFi hot-spots are supported for mobile working groups.
- Future LTE-U/LAA – LTE Unlicensed (LTE-U) and/or License Assisted Access (LAA) – LTE transmission in unlicensed bands
- Augment limited licensed spectrum, Uses unlicensed ISM band 5.9GHz and 2.4GHz
- Faster transmission rates (LTE & LTE-U aggregation)
- Better cell edge performance

Lte

NB-IoT

- Narrow Band Internet of Thing Gateway with dedicated LTE as back-haul
- >100,000 devices can be connected per sector
- NB-IoT compliance chipset target price at around $5 per device to enable secure connections at very low cost.

Private Network with total control and monitoring by each user group

Single Core Network for various Wireless Network

Increase Productivity and Efficiency

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Building Dedicated LTE using TDD spectrum to Open New Applications in Critical Communication **for Vertical Industries**

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Dedicated TD-LTE Technology to Serve Vertical Industries

Oil & Gas

Sea Port

Airport

Public Transport

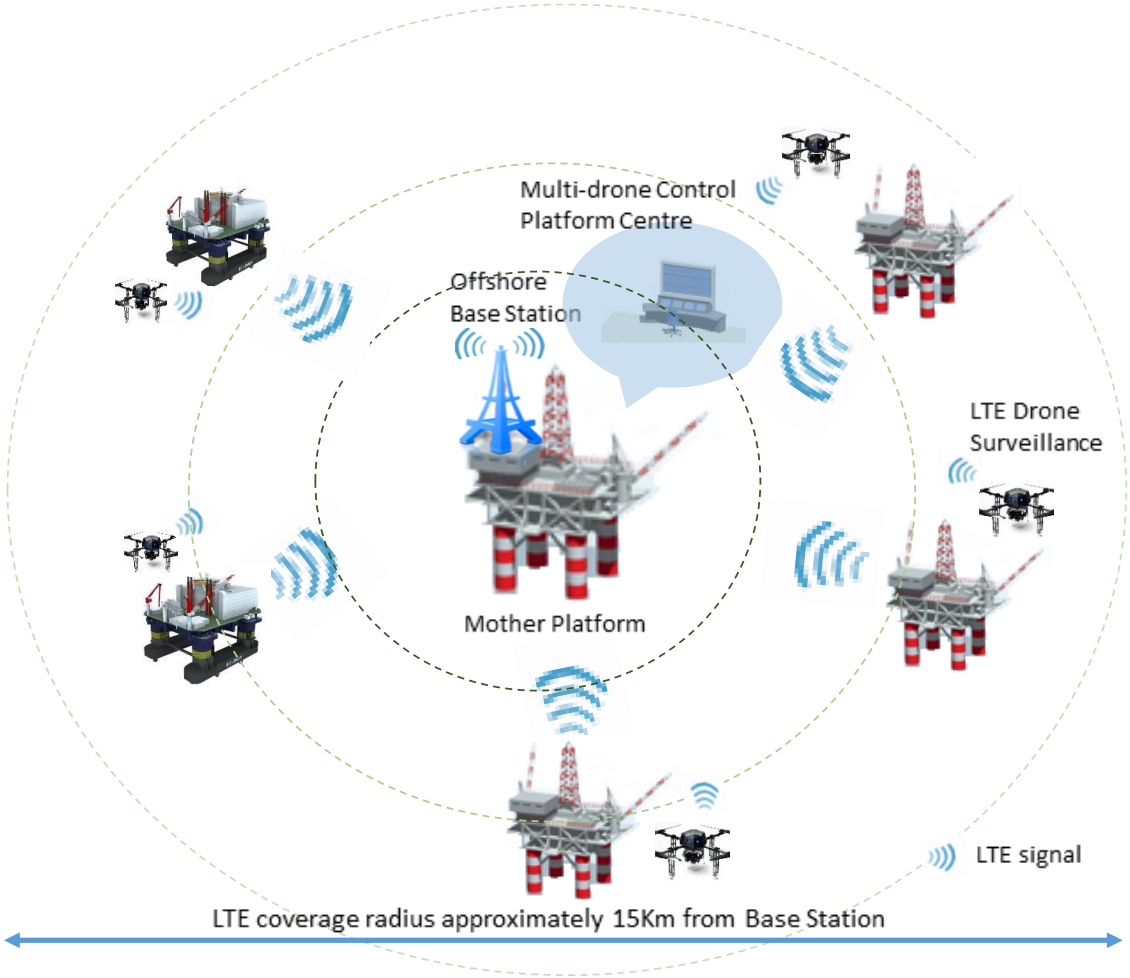
Mining

Plantation

Smart Industry Park

Public Utility

Dedicated LTE Network for Off-shore Rig



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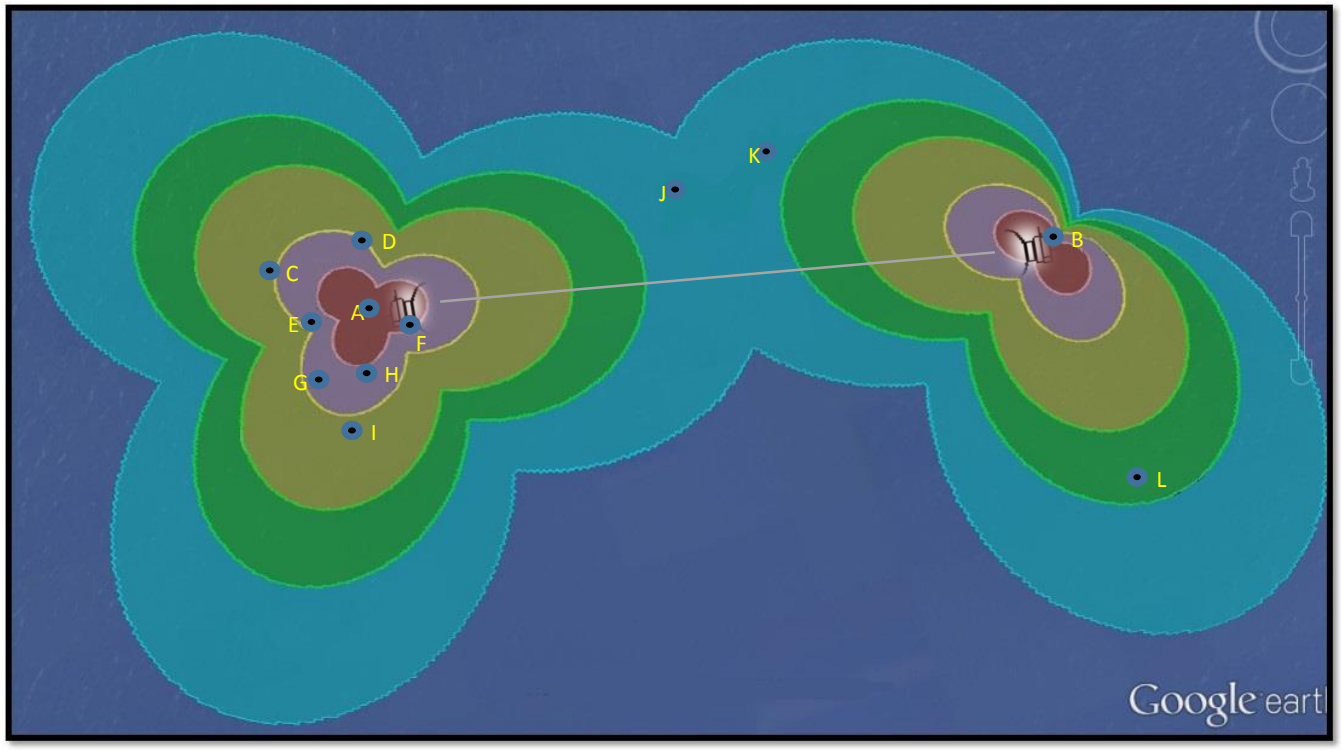
Dedicated LTE Solution

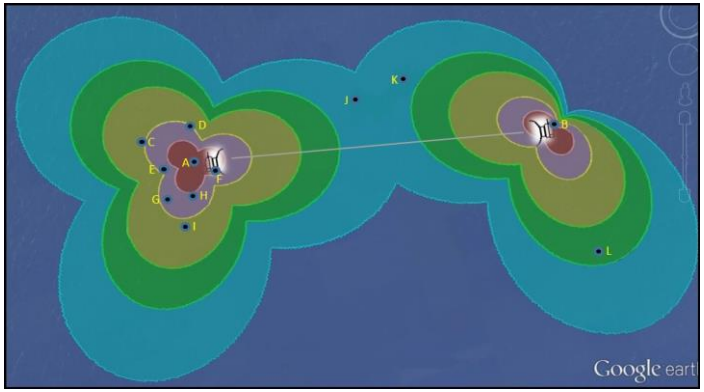


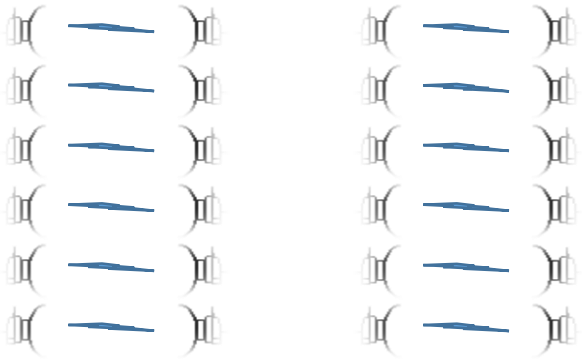
Solution
1 Core network at location A
2 Base station at location A and B
12 CPE each at every platform

5 cells cover 12 platform
SA0 (Every cell) DL/UL =11.95Mbps/18.73Mbps
SA1 (Every cell) DL/UL =20.22Mbps/12.18Mbps

Dedicated LTE Solution

2 Base Station with 12 CPEs OR 12 pairs of expensive microwave Links

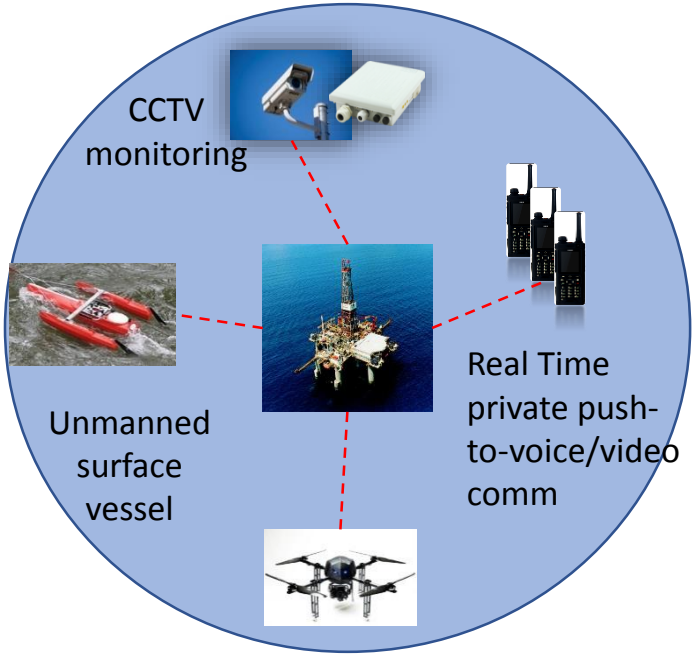




Low touch installation 、 Easier Operation Management and Maintenance
No impact on deployed LTE sites for rig movements due to wave and wind
Dynamically distribute bandwidth for each platform
A better way to solve the communication between ship, UAVs and platform
4G broadband and trunking applied on Oilfield, UAVs under LTE Service in near future

Oil Rig Enhanced Application utilising Dedicated LTE

- Inspection of oil rig (Visual/Thermal)
- Wide area coverage up to 10KM radius
- Real time monitoring and control
- Detection of oil and gas leak
- Security surveillance
- Video and voice trunking
- Oil and chemical contamination monitoring

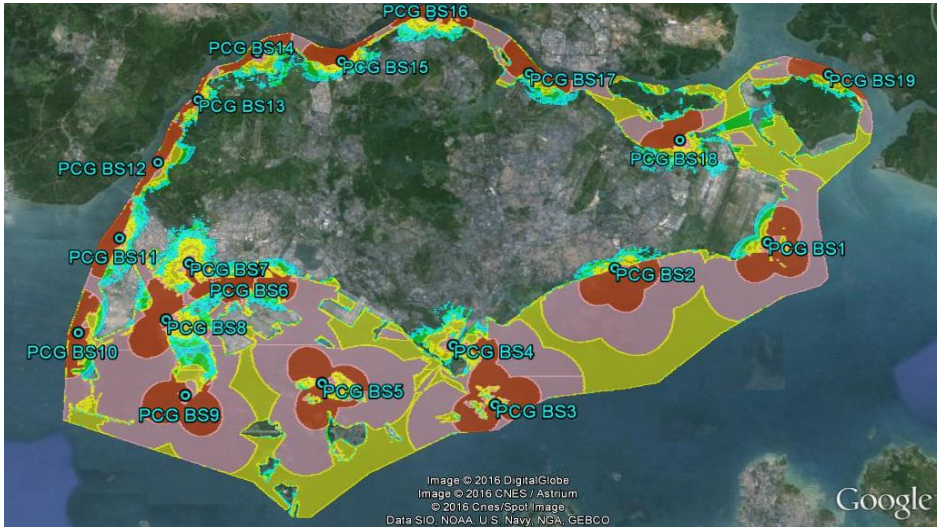


Police Coast Guard :

Using Dedicated LTE to enhance Surveillance function, increase Police Coast Guard presence in Territory Water

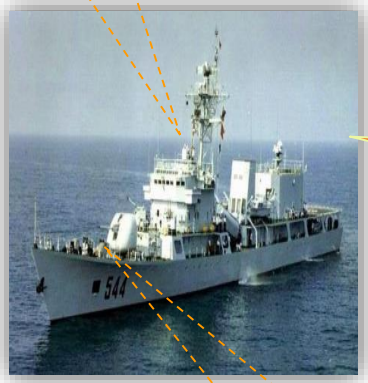
Proposed Base Station Location

Proposed Coverage plan



S/N	Base Station	Longitude	Latitude
1	PCG BS1	104° 1'21.17"E	1°19'12.86"N
2	PCG BS2	103°55'46.17"E	1°18'13.84"N
3	PCG BS3	103°51'26.10"E	1°13'13.30"N
4	PCG BS4	103°49'56.22"E	1°15'22.17"N
5	PCG BS5	103°45'17.93"E	1°13'59.63"N
6	PCG BS6	103°42'43.94"E	1°18'7.05"N
7	PCG BS7	103°40'19.55"E	1°18'25.28"N
8	PCG BS8	103°39'37.46"E	1°16'18.80"N
9	PCG BS9	103°40'28.23"E	1°13'33.53"N
10	PCG BS10	103°36'30.05"E	1°15'49.91"N
11	PCG BS11	103°37'43.82"E	1°19'22.39"N
12	PCG BS12	103°38'56.72"E	1°22'17.93"N
13	PCG BS13	103°40'17.74"E	1°24'46.94"N
14	PCG BS14	103°42'25.21"E	1°26'42.32"N
15	PCG BS15	103°45'38.06"E	1°26'20.99"N
16	PCG BS16	103°48'58.75"E	1°28'13.34"N
17	PCG BS17	103°52'42.43"E	1°25‘51.06"N
18	PCG BS18	103°58'17.38"E	1°23'10.18"N
19	PCG BS19	104° 3'59.18"E	1°25'48.87"N

Dedicated LTE for SPF/SCDF Marine (On Shore)



Ship

Base Station
at the coast

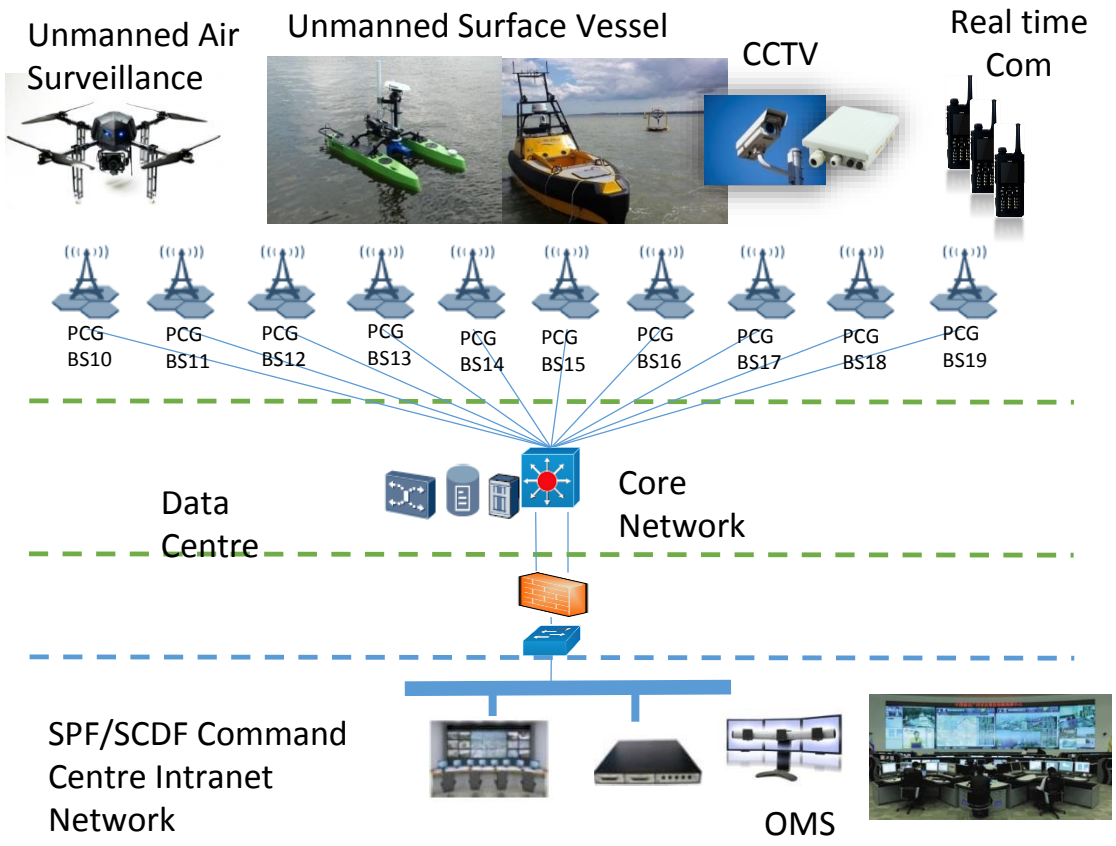
Command HQ

Fiber

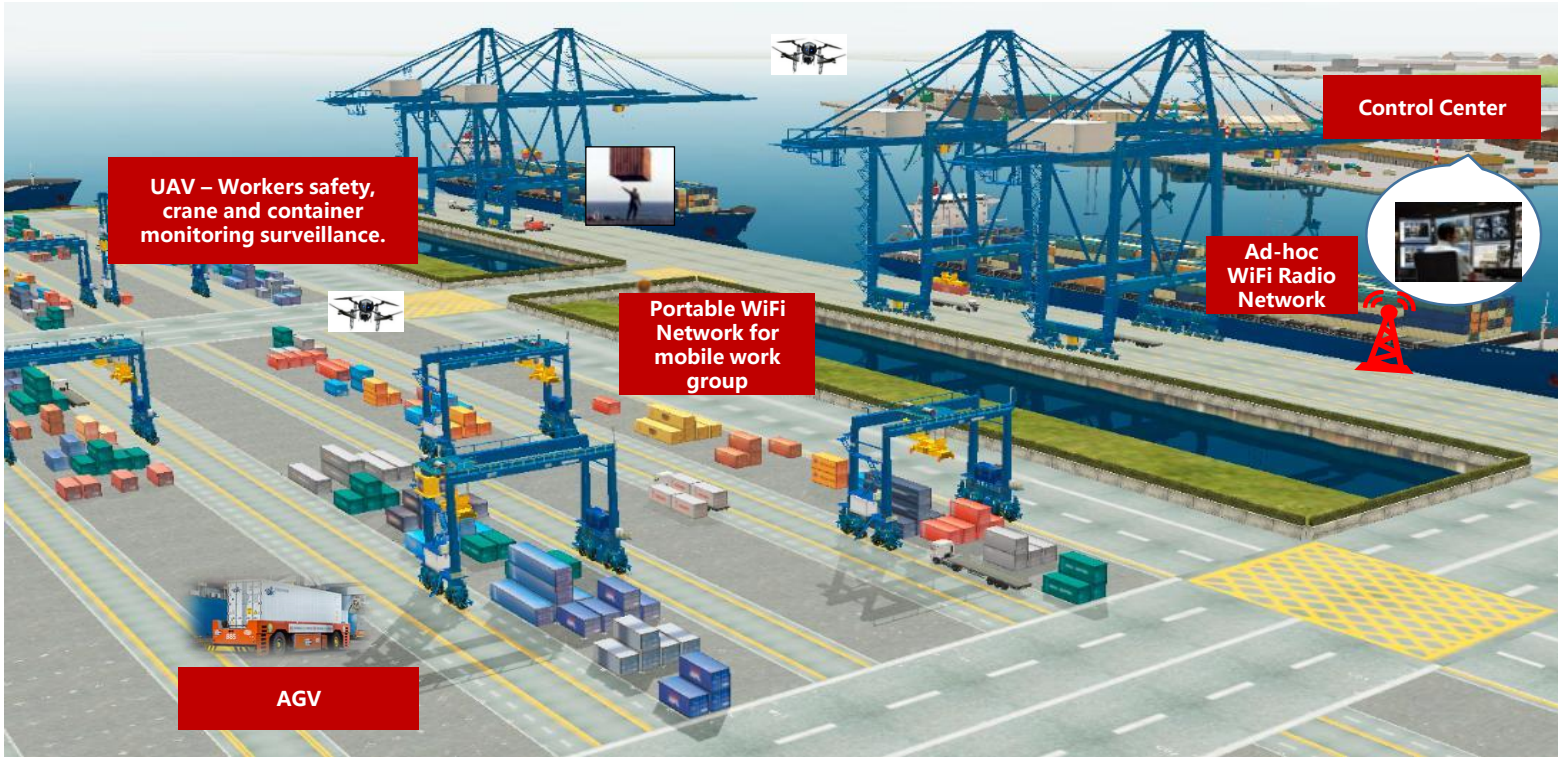
Command Center
on substation

Coast Guard Applications

- Private dedicated LTE wireless broadband network
- Real time monitoring and control
- Counter terrorist threat
- Increase police presence through unmanned surveillance UAVs and USVs
- Assessing volatile situation quickly using UAV controlled via Central Command Centre
- Identify anomalies & analyse the situation
- Facilitate operation decision making
- Quick deployment in months
- Enhance crime fighting ability
- Reduce number of Coast Guard Ships
- Improve Operation Efficiency needing less ship based surveillance trips



Port Operator Use Case and Deployment



Using 2 LTE Base Stations to replace ~50 WiFi APs with seamless mobility, low latency and free of interference

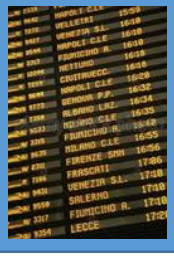
Dedicated Mission Critical Data Network For Metro Railway Management

Real time CCTV monitoring, perimeter surveillance

Real time push-to-video, push-to-talk communication, enable video trunking during emergency event

Real time, dedicated crowd and commuter management

Real time information system

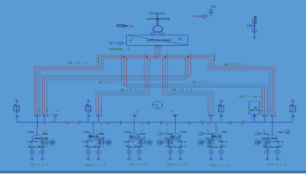


Real Time In train and Track Communciation, Diagnostic, Video Streaming, Comm & Security System

Commuter monitoring and behaviour analysis

Intelligent Train Signalling and Scheduling

Smart Grid



Many MRT Signaling operations use WiFi and got intermittent interference and cause signaling and service disruptions

Dedicated LTE Network for Large Manufacturing Site like Ship Yard

- Enable off-shore operational testing of ships and oil rig/platforms via wireless data links
- Setting up of data access points on an ad-hoc basis depending on the operational needs and new structures within ship-yard.
- Portable work groups sharing same data access point within ship-yard.
- Voice, video and data trunking for mission critical communication especially during emergency
- UAVs could be used for safety inspection to ensure safe workplace and perimeter surveillance

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Co-Innovation Development Platform in Singapore

- Arete M and Nanyang Technical University of Singapore has set up a Co-Innovation Platform using this 1.79GHz-1.80GHz spectrum to enable innovators around the world to showcase and integrate their product innovations into the dedicated LTE Network

- Will focus on unmanned machines, unmanned vehicles, mobile robotics and NB-IoT

- Open to work with any collaborative vendors that want to have their platforms included in the open access Co-Innovation Platform in this prestigious University that is ranked top 10 in Asia.

Replicating Singapore References in your Countries

- Arete M will showcase the world first commercial Dedicated eLTE Network using the 1.79GHz-1.80GHz frequency spectrum

- This Operating and Solution Platforms can be easily replicated in any other countries as the 1.79GHz – 1.80Ghz spectrum are re-useable with proper RF Implementation when that country has re-deployed LTE in place of the old GSM technology on Band 3

- Open to work with any Regulators and Operators to replicate this Operating and Solution Platform in their countries to provide Dedicated Mission Critical Communication utilising this un-used spectrum band and to serve the vertical industries as part of the 5G road map

Thank you!

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