

VTS47-3.1.3.5

M P A
SINGAPORE

VHF Data Exchange System

for future maritime e-navigation

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Institute for
Infocomm Research



ST Engineering
Electronics

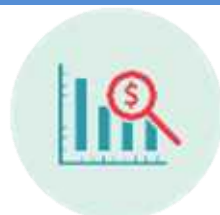


Scope

- Maritime Singapore
- Singapore VDES development
- Next Steps and Proposal

Singapore Skyline by Kenny Teo (<https://www.flickr.com/photos/cheishichiyo/6639878229>)

Maritime Singapore



CONTRIBUTES **7%** TO OUR
NATION'S GDP



OVER **170,000** EMPLOYEES



MORE THAN **5,000** MARITIME
ESTABLISHMENTS



WORLD'S BUSIEST **CONTAINER**
TRANSHIPMENT HUB



IN 2017, VESSEL ARRIVAL TONNAGE
REACHED **2.8 BILLION GT**



33.7 MILLION TEUS OF CONTAINER
THROUGHPUT IN 2017



APPROXIMATELY **1,000 SHIPS** IN
THE PORT OF SINGAPORE AT ANY
ONE TIME



SUPPLIED **50.6 MILLION TONNES**
OF BUNKER IN 2017



THE SINGAPORE REGISTRY OF SHIPS
(SRS) IS AMONGST THE WORLD'S
TOP 5 LARGEST SHIP REGISTRIES

Safety of Navigation



More than 130,000 ship calls at Singapore annually



About **1,000 ships** in port at **any one time**



A ship arrives or departs the port every 2 to 3 minutes

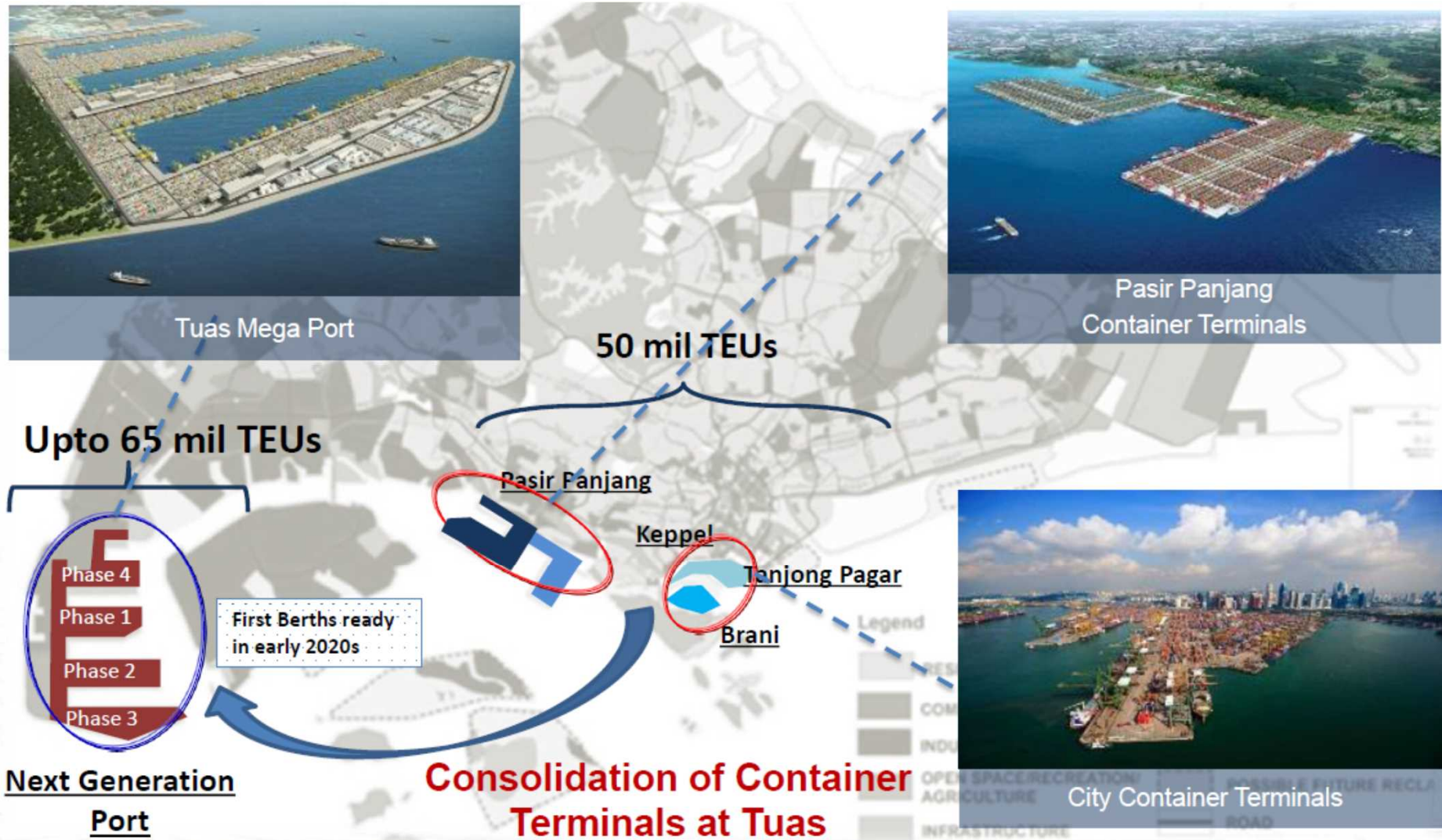


Navigational safety is key!

VTIS operators assist vessels by:

- Providing traffic information
- Alerting vessels
- Issuing navigation warning"

Next Generation Port 2030



Components of Next Gen VTMS Innovation Programme for Collaboration

Input

Current & New Sensors



Maritime Data Hub



Big Data

Infrastructure Platforms

Shore Console

Shore Planning Station

VTMS Workstation

Communications

4G/5G/
LTE

Local Area
Network (LAN)

Internet

Satellite Comms

VHF Exchange
System (VDES)

Ship Console

Ship Planning Station

Electronic Chart Display & Info Sys

Cyber Security

Modules

Open System Architecture (Use of APIs)

Core

Smart Algorithm to Detect Collision

Proactive Traffic Management

Ship-Shore Reporting

E-Navigation Maritime Services Portfolio

Automatic Movement Reporting in Port Waters

Advanced Human Machine Interface

Own UAV/USV Interface & Display

Secondary

Wearable/Mobility Technology

Virtual Sectorial Control

Ergonomics & Working Environment

Additional

Integration with other Maritime Single Windows (MSW)

Just In Time Modules (JIT)



Smart Collision Detection



E-Navigation Services

VHF Data Exchange System (Mobile Station)

Project Overview

- VDES Mobile Station prototype is developed by ST Engineering Electronics and A*STAR-I²R with **co-funding, domain expertise and technical support from MPA**;

Novelty Features

- **Low profile antenna** : high throughput and longer range communications;
- **Multi-channel post-processing** : improve system robustness;
- **Intelligent slot selection** : ensure high Quality of Service data delivery among ship-ship and ship-shore bi-directional communications;

Benchmarking

- The sea trial results have been presented to IALA ENAV22 meeting



Our low profile antenna is about 25cm

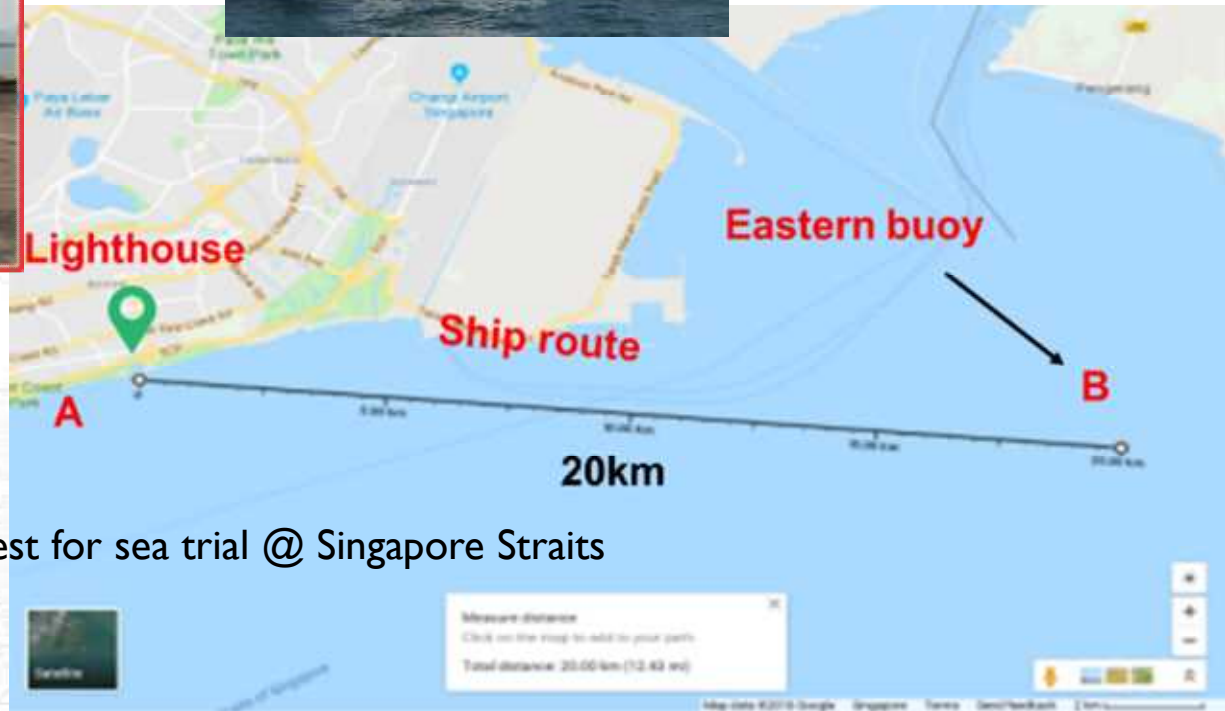


Typical Maritime VHF band antenna is about 1m in length

Sea Trial for VDES Mobile Station



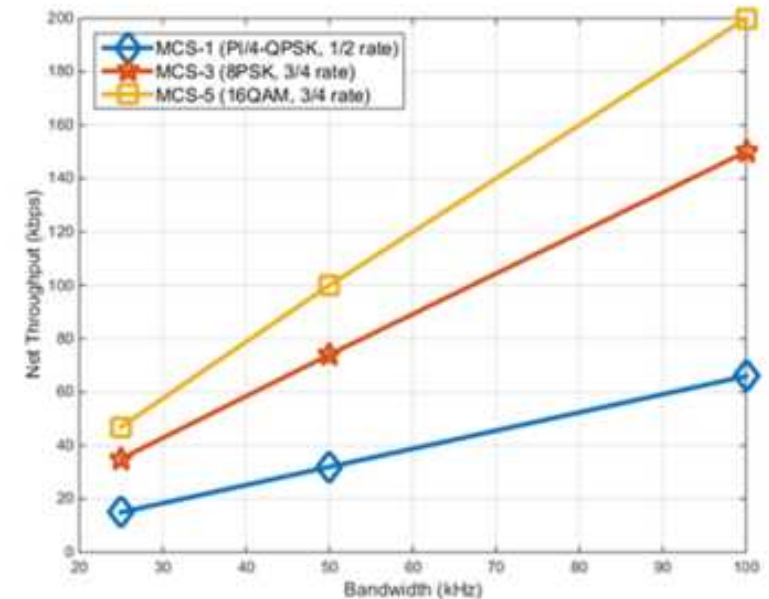
Setup at Shore Station (Bedok Lighthouse)



Shore-to-ship and ship-to-ship test for sea trial @ Singapore Straits

Sea Trial Results for VDES Mobile Station

MCS – Bandwidth	Nett Throughput	Gross Throughput
MCS1 25 kHz	16.2 kbps	38.4 kbps
MCS1 50 kHz	33.6 kbps	76.8 kbps
MCS1 100 kHz	67.2 kbps	153.6 kbps
MCS3 50 kHz	75.6 kbps	115.2 kbps
MCS3 100 kHz	151.2 kbps	230.4 kbps
MCS5 25 kHz	48.6 kbps	76.8 kbps
MCS5 50 kHz	100.8 kbps	153.6 kbps
MCS5 100 kHz	201.6 kbps	307.2 kbps



Publicity and Awards

Teo Chee Hean's post

Singapore Deputy Primary Minister (DPM) Visit on 9 May 2018. A*STAR-I²R Senior Scientist Dr. Peng Xiaoming explained how Very High Frequency Data Exchange System (VDES) can enable ship-to-ship & ship-to shore communication 50km away.



A*STAR Snr Scientist explained how Very High Frequency Data Exchange System (VDES) can enable ship-to-ship & ship-to-shore communication 50km away

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Singapore MOT Minister's Innovation Award 2018

Next Steps

- Phase 1 of mobile station completed
 - A*STAR I2R and STEE exploring other phases of development
- Satellite VDES development on-going
- Propose an inter-operability test with Norway, Japan, Australia
- VDES track at e-Nav IOC workshop in Singapore (8 to 10 April)
 - Tech demos include ship-ship data sharing, portable pilot unit transmission
 - Continue discussions on inter-operability test with Norway and Japan
 - If possible, announce at end of workshop and have input paper at ENAV 24
- World Radio Conference 2019 for spectrum (Satellite VDES)

We welcome partnership with you!





Thank You

