



# DroNet

**Inspection • Public Security • Delivery**

First in Singapore to be approved for Beyond Visual Line of Sight (BVLOS) flights, DroNet solution enables diverse applications such as facility or perimeter security, site inspections, deliveries and more.

## Introducing DroNet

The DroNet Solution is developed by ST Engineering for Beyond Visual Line of Sight (BVLOS) flight operations to augment the human operators through multi-UAV operations, safer workflow automation, wide aerial data collection and smart analytics.

The system is the first in Singapore to be approved by the Civil Aviation Authority of Singapore to conduct BVLOS flight operations for surveillance and monitoring of reservoirs in year 2019. Unlike the conventional drone operation where a drone is operated within the pilot's visual line of sight, the BVLOS capabilities enable DroNet to cover far greater distances to collect more data in less time.

The DroNet System has been deployed and operated in several applications such as fenceline patrol for intruder protection, remote islands maintenance surveillance, industrial area security surveillance, water activities monitoring at the reservoirs as well as shore to ship deliveries. At present, the DroNet system has flown and clocked over 5000 hours of flight time.



### FULL-PACKAGE SOLUTIONS

The DroNet solution includes the smart analytics, anomaly alerting and data storage suites, making it an end-to-end package.



### BVLOS

Designed for Beyond Visual Line of Sight flight operations in urban environments.



### SAFE

Incorporated with robust flight management features and redundancies for safe flights.



### QUICK TURNAROUND

Rapid payload and battery-swapping mechanisms ensure mission continuity.



### SMART ANALYTICS

User is provided with the most relevant data to make well-informed decisions.



### DRONE AGNOSTIC

DroNet can be compatible for use with other commercial, off-the-shelf drones.



## Key Components

The DroNet solution comprises of the DrN series unmanned aircraft (UA), the DroHub centralized control station, the DroPort docking station and DroConnect smart web platform for flight monitoring, data analytics and real-time data distribution. These sub-systems are interlinked through the public/private 4G LTE network (provision for 5G in future), Radio Frequency (RF) and satellite communication to form the core network infrastructure to provide robust connectivity with cybersecurity protections.



## DrN Series Drones

### Safety features

Navigation sensors and communication link redundancy

1

Flight template confinement

2

Obstacles Detection and Collision Avoidance

3

Approved for BVLOS flight operations in Singapore and specific countries

4

The **DrN series UAs** are autonomous Vertical Take-off and Landing (VTOL) aircraft platforms designed to meet the safety regulatory requirements for BVLOS operations. The Flight Control Computer (FCC) and the Guidance, Navigation and Control (GNC) software are developed by ST Engineering to customise several safety features such as hardware and sensors redundancy, automated failsafe handling features, collision avoidance and flight template confinement to meet diverse regulatory requirements around the world for safe BVLOS flight operations. The DrN Series UA has a payload bay that can carry a basic 2-in-1 Electro Optical and Infra-Red (EO/IR) camera. This allows the UA to be used for day and night operation. The payload bay is configurable to carry different sensors for different applications.



# DrN-15L

Design for maximum payload capacity.



## Take-off Weight

Up to 16.6kg



## Endurance

Up to 46 minutes  
(without payload)



## Flight Operation

BVLOS via 4G (dual  
sim) and RF datalink



## Operating Altitude

3500 feet AMSL



## Payload Weight

Up to 4.2kg



## Payload Compatibility

Payload-swappable and  
compatible with EO/IR,  
Hyperspectral, LiDAR and  
methane detectors etc



## Safety Features

Navigation sensors and datalink  
redundancy, Obstacle Detection  
and Avoidance (Forward only),  
Flight template confinement



# DrN-15DL

Designed for on-demand operation with DroPort.



**Take-off Weight**  
Up to 16.6kg



**Endurance**  
Up to 39 minutes  
(without payload)



**Operation Mode**  
BVLOS via 4G (dual sim)



**Operating Altitude**  
3500 feet AMSL



**Payload Weight**  
Up to 1.9kg



**Payload Compatibility**  
Payload-swappable and  
compatible with EO/IR,  
Hyperspectral, LiDAR and  
methane detectors etc



**Safety Features**  
Navigation sensors and  
datalink redundancy,  
Obstacle Detection and  
Avoidance (Forward only),  
Flight template confinement



# DrN-15DH

Designed for on-demand operation with DroPort over populated area.



## Take-off Weight

Up to 16.6kg



## Endurance

Up to 38 minutes  
(without payload)



## Operation Mode

BVLOS via 4G (dual sim)



## Operating Altitude

3500 feet AMSL



## Payload Weight

Up to 1.3kg



## Payload Compatibility

Payload-swappable and compatible  
with EO/IR, Hyperspectral, LiDAR  
and methane detectors etc



## Safety Features

Flight Computer, Power  
Distribution, Navigation  
sensors and datalink  
redundancy, Obstacle  
Detection and Avoidance,  
Flight template confinement



# DrN-25

Designed for extended endurance (up to 90 minutes).



## Take-off Weight

Up to 25.0kg



## Operation Mode

LOS using 2.4GHz  
BVLOS via 4G (dual sim)



## Payload Weight

Up to 6.0 kg



## Safety Features

Navigation sensors and  
datalink redundancy,  
Obstacle Detection and  
Avoidance (Forward only),  
Flight template confinement



## Endurance

Up to 90 minutes  
(without payload)



## Operating Altitude

13,000 feet AMSL



## Payload Compatibility

Payload-swappable and compatible  
with High-Resolution Camera, UV  
Corona Detection Camera, EO/IR  
with Laser Rangefinder Camera etc



# DrN-35LS

Designed for delivery operation.



**Take-off Weight**  
Up to 36.3kg



**Range**  
Carrier Box – 14Km  
Winch – 16Km



**Payload Weight**  
Carrier Box – 7kg  
Winch – 3Kg



**Operating Altitude**  
5000 feet AMSL



**Operation Mode**  
BVLOS via 4G (dual sim)  
Satcom (add-on option)



**Safety Features**  
Navigation sensors and  
datalink redundancy,  
Obstacle Detection and  
Avoidance (Forward only),  
Flight template confinement





# DrN-40

Designed for long range delivery solutions.



## Take-off Weight

Up to 35.0kg



## Endurance

Up to 150 minutes



## Operation Mode

BVLOS via 2.4GHz or  
4G (dual sim)



## Operating Altitude

5,000 feet AMSL



## Payload Weight

Up to 10.0 kg



## Payload Compatibility

Payload Compatibility: Payload-swappable and compatible with Delivery Box and EO/IR etc



## Safety Features

Navigation sensors and datalink redundancy, Obstacle Detection and Avoidance (Forward only), Flight template confinement

## DroHub

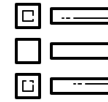


The DroHub is an integrated and scalable command and control hub that makes multiple UAVs control possible. Equipped with smart analytics capabilities, users can track concurrent missions in real-time.



### Adaptable to Various Uses

Modular apps and customisable user interface make it adaptable to different use cases



### Multiple Drone Control

Multiple UAV missions can be carried out simultaneously for better efficiency



### Ease of Mission Planning

Click-and-fly waypoint marking and automated route planning



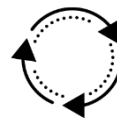
### Collaborative

Hand/take-over of mission control is possible across all DroHub terminals



### Cross-Compatibility

Usable across different electronic devices



### UAV-Agnostic

Easily adaptable to other commercial drones





## DroPort

The DroPort is a secured docking station (drone-in-a-box concept) for UAs that allows permanent on-site deployment of DroNet at remote places. The DroPort enables automatic launch and recovery of the DrN-15 series UAs.



### Drone Storage

- 4G-enabled all-weather drone station for safe automated drone storage.



### Battery Swap

- Automatic battery replacement in between flights without need for on-site operator.
- Spare batteries are on standby, enabling quick turnaround for subsequent missions.
- Depleted batteries are automatically charged once they are removed from the drones.



### Payload Swap

- Automatic payload swapping enhances drone's adaptability to new scenarios mid-operation.
- Different payloads can be swapped to cater to different applications.
- "Plug-and-play" concept enables quick turnaround.



### Operation Modes

- Highly reliable precise landing capability with up to centimetre precision.
- Precise landing in all weather conditions.
- Range extension through DroPort hopping.

## DroConnect

The DroConnect Smart Web Platform is an intelligent, web-based portal. It provides real time UAs statuses, live video stream, and data analytics using Artificial Intelligence.



### Security

- Automatic human detection, identification and tracking.
- Automated object (vehicle and weapon) detection, identification and tracking.
- Real-time alerts with accurate geospatial information post to operators.



### Inspection

- Powerline and solar panel defects detection and classification.
- Aircraft general visual inspection.
- Reservoir monitoring.



**DroNet**



 **ST Engineering**

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