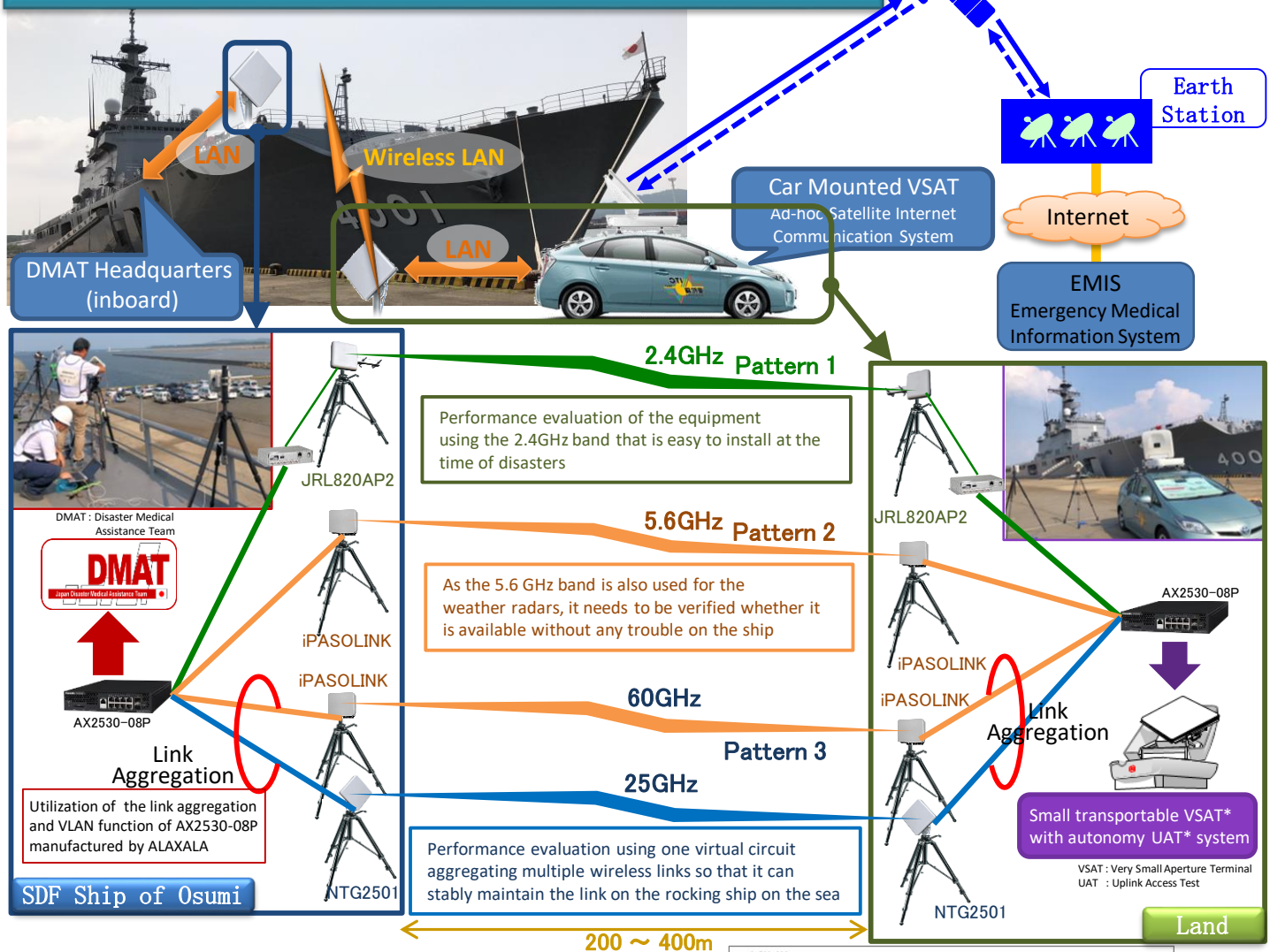
Last One Mile Connectity at the Time of Disaster

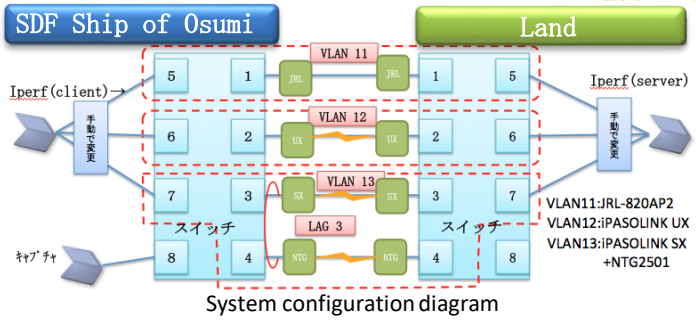
Abstract

Satellite network system is a promising solution that can provide the Internet access to disaster areas. However, it is impossible to deploy the ground stations to all disaster areas in terms of cost and the technical limitations. Therefore, extending the limited Internet connections to the disaster areas is an effective way to expand the network connectivity.

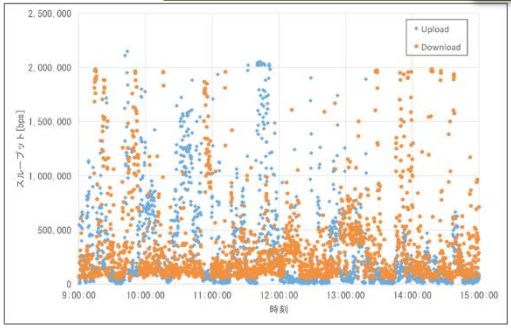
For the purpose, we have performed two experiments. One is an experiment using a satellite circuit and a wireless multipath network for DMAT (Disaster Medical Assistance Team) in medical disaster prevention drills conducted in Wakayama on July 29, and the other is an experiment of wireless relay using drone.

Case1: An Experiment of Wireless Multipath Network Effectiveness from Land to a Ship for an SCU Activity Support Network





System configuration diagram



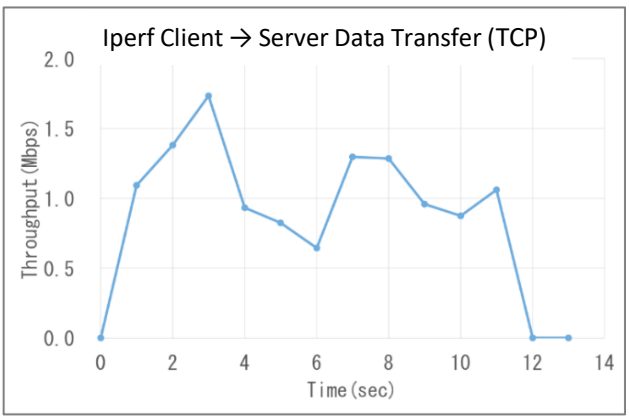
Result

- The 5.6 GHz band is not available on the ships
- Link aggregation (LACP) is effective to improve availability
- The bandwidth of the satellite line is the bottleneck rather than the last one mile network

Case2: An Experiment of a Drone Wireless Network Effectiveness from Land to a Ship for an Staging Care Unit(SCU) Activity Support Network at the Time of Disaster

Implemented October 17, 2018

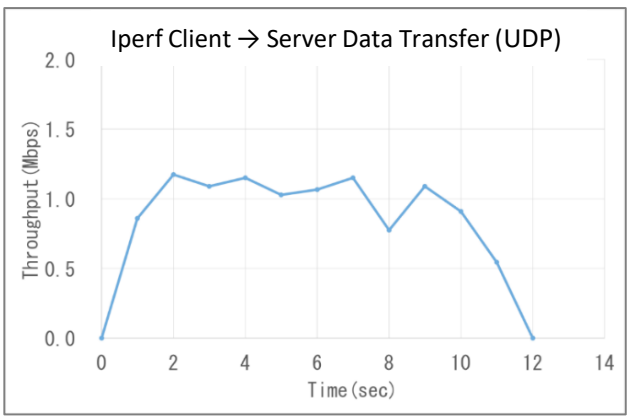
Results and Consideration



Throughput : MAX 1.8Mbps
Many retransmissions
Delay is 50msec

There is no problem as throughput and delay required at the time of disaster.

However, Access to EMIS may be affected, as there are many TCP retransmissions.



Throughput : MAX 1.2Mbps
NO retransmission because of UDP
Delay is 50msec

There is no problem as throughput and delay required at the time of disaster.

There is no problem for audio communication and TV conference.

Conclusion

- Wireless relay using drones expands the range of use of satellite link.
- There is possibility of Web access failure because of TCP packet retransmission.
- No problem for Audio and Vide Communication

Future Challenges

- Issues for TCP Packet retransmission
- Experiment using drone at DMAT training in the Kyushu area on November 10 is under review