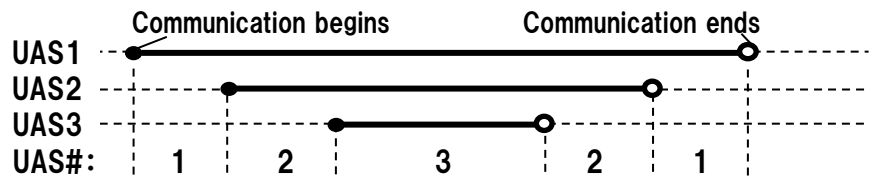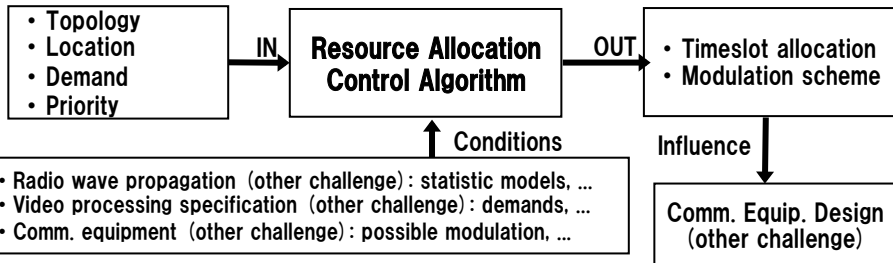# Research and Development for Efficient Frequency Use in UA Systems
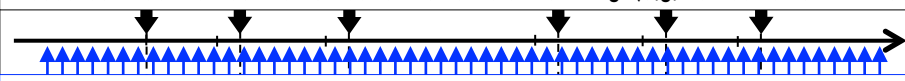
We implement a resource allocation control algorithm for sharing frequency between unmanned aircrafts (UA) in the same airspace. We research and design such algorithm for efficient resource allocation based on input such as location, priority, requested resources, evaluating it in real usage scenarios for UA systems. Additionally, we also evaluate the delay brought by the resource allocation control algorithm itself.

- **Development of resource allocation control algorithm (considering results of other challenges)**
  - Determine modulation scheme and resource allocation based on position, amount requested, ...
  - Design practical algorithm based on results of other challenges

- Topology
- Location
- Demand
- Priority

IN → **Resource Allocation Control Algorithm** → **OUT**

- Timeslot allocation
- Modulation scheme

Conditions

- Radio wave propagation (other challenge): statistic models, ...
- Video processing specification (other challenge): demands, ...
- Comm. equipment (other challenge): possible modulation, ...

Influence

Comm. Equip. Design (other challenge)

Communication begins   Communication ends

UAS1
UAS2
UAS3
UAS#:   1   2   3   2   1

Resource allocation control is needed for efficient sharing (e.g. number of UAS varies)
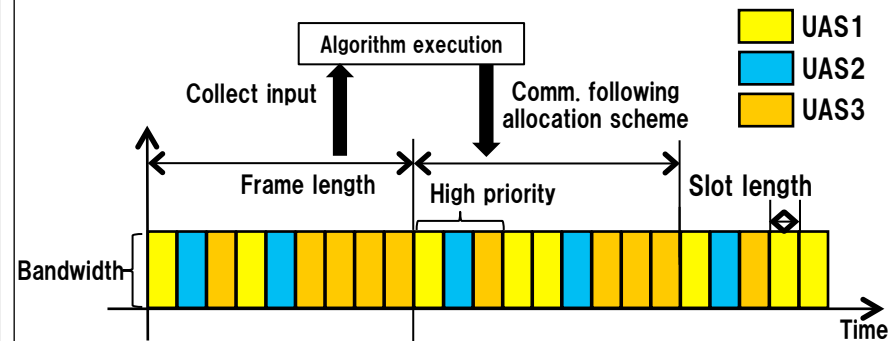
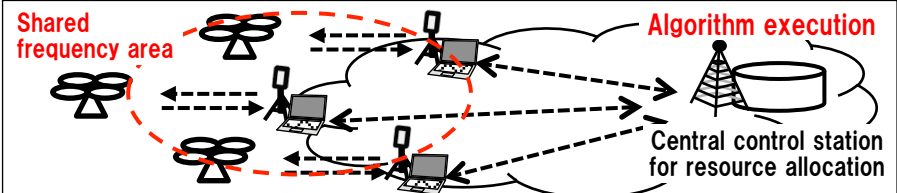Resource allocation control for improved efficiency when sharing (e.g. demands vary)

The goal is to triple frequency utilization efficiency through implementing sharing and improving efficiency in shared time

- **Design delay guaranteed transmission control method**

Ex.: guarantee delay through repeating frame structure

UAS1
UAS2
UAS3

Algorithm execution

Collect input   Comm. following allocation scheme

Frame length   High priority   Slot length

Bandwidth

Time

- Consider priority scheme, uplink and downlink communication
- Formulate relationship between main parameters (e.g. frame and slot length)
- Design a low complexity control method (minimum feasible control interval)

Shared frequency area   Algorithm execution

Central control station for resource allocation

Application that is independent of shared frequency area and location of central control station
Design flexible algorithm (figure is a example when central control station exists)