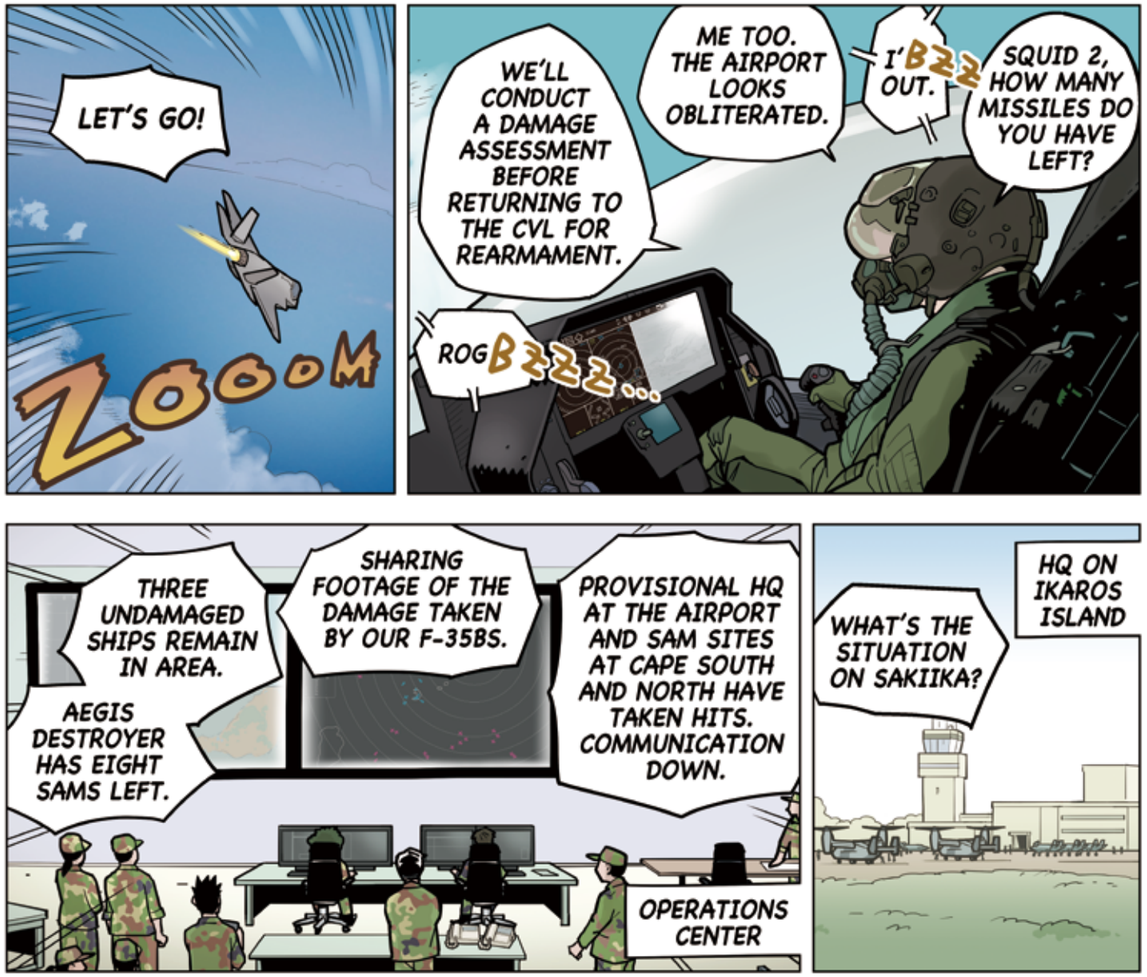
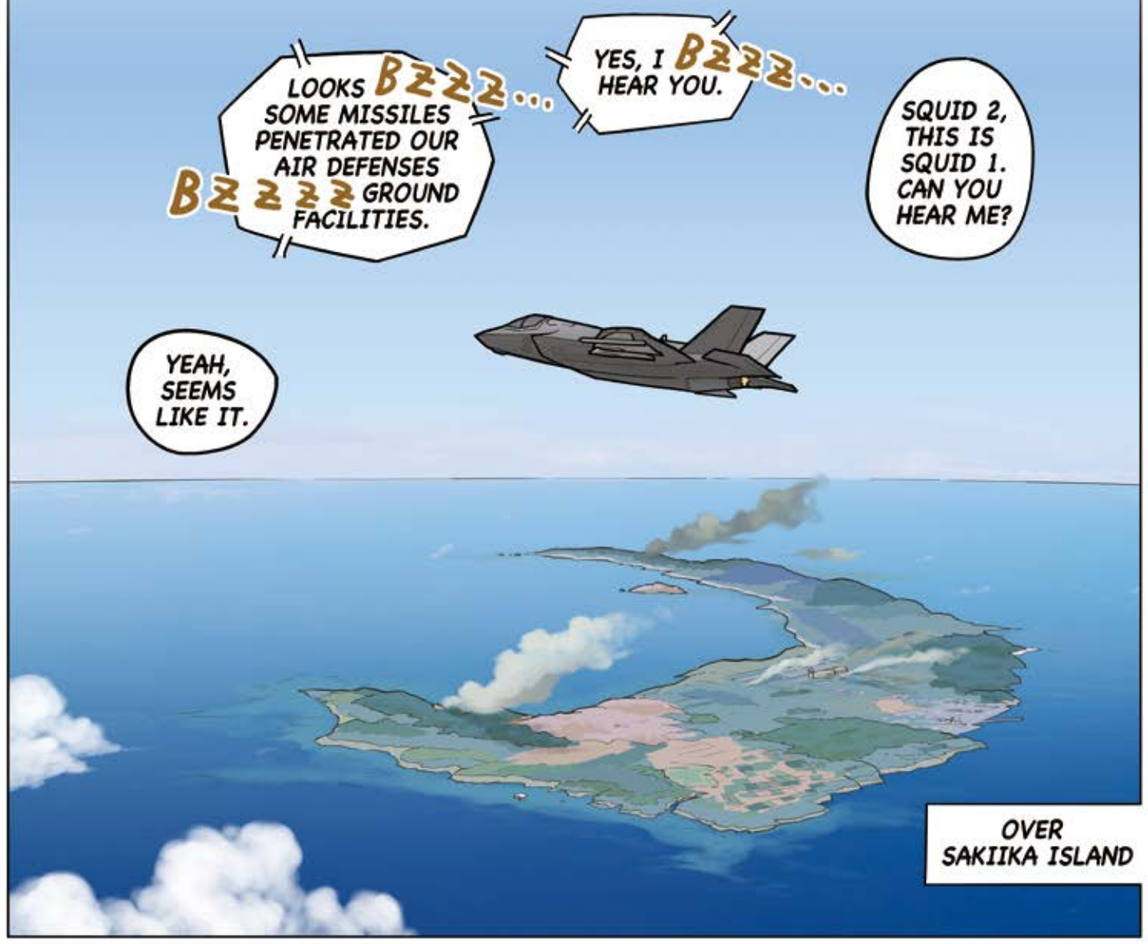
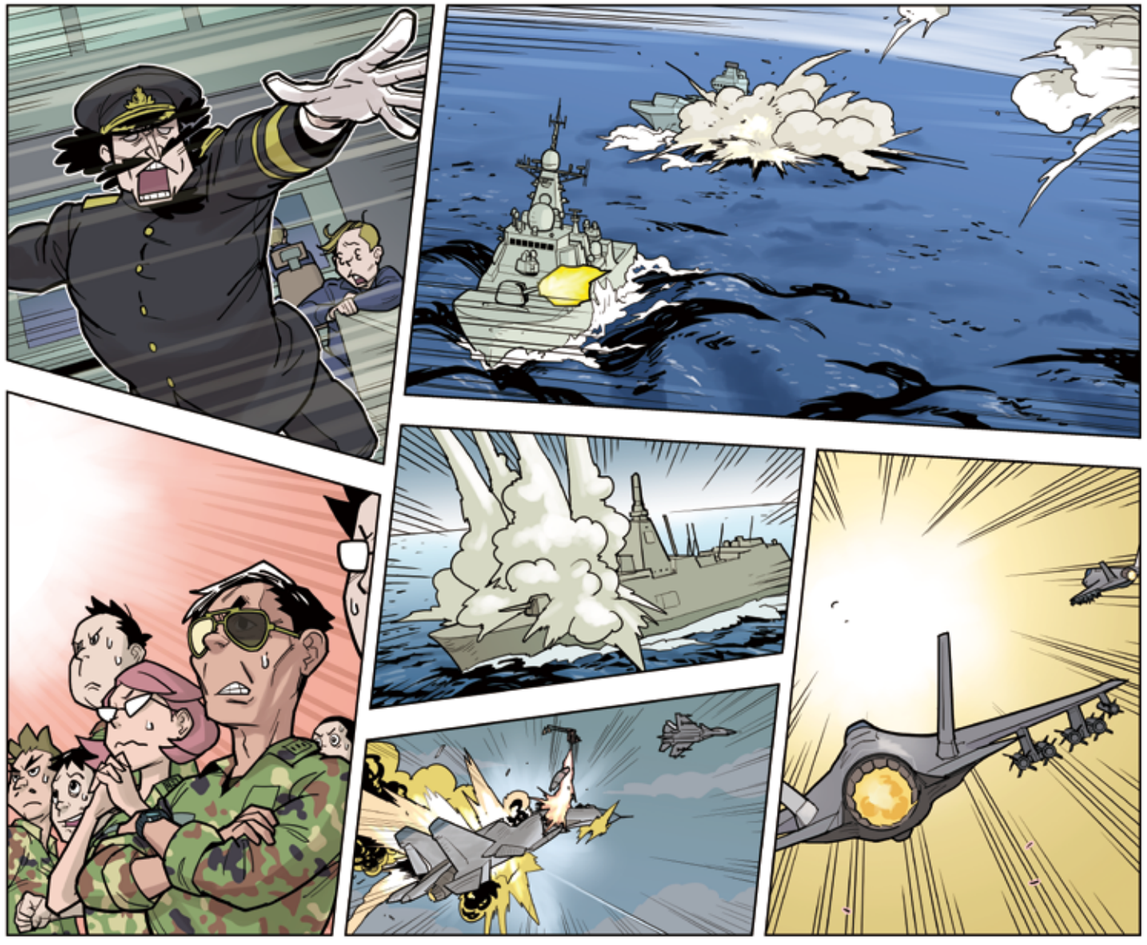


Episode 6:

Joint Operations: Alliance Information Sharing

IBCS successfully intercepted the scores of cruise missiles targeting the islands with pinpoint accuracy. However, the enemy immediately changed their target in a second wave of attacks. Missiles are starting to break through the defense net and hit Sakiika Island as the SAM unit is running out of munitions. Can the Ikaros Defense Force manage to protect the islands to the very end!?




THANK YOU.
NOW IT'S TIME FOR US TO JOIN FORCES.
OUR AIR FORCE AND NAVY F-35S ARE GOING TO POUND THEIR SHIPS.
WE APPRECIATE YOUR DEFENSE OF THE ISLAND.
OUR BASES HERE WERE ALSO TARGETED IN THE FIRST ATTACK.
ALLIED FORCE AIR BASE
RECEIVING DATA.
VROOM
AWESOME! WE CAN SEE THE WHOLE ENEMY FLEET!
WE'LL SHARE THE FLEET LOCATION INFORMATION WITH YOUR JETS VIA IBCS.
GREAT! THAT WAY WE CAN AVOID UNNECESSARY RISK TO OUR PILOTS.
OUR MISSILES ARE FULLY CAPABLE OF STAND-OFF STRIKES, BUT WE SHOULDN'T UNDERESTIMATE THE ENEMY FLEET'S AIR DEFENSE.
OUR FIGHTER JETS COULD BE SHOT DOWN BEFORE COMING INTO RANGE.
FIRE!
BLAM
THIS IS DIAMOND 1. WE'RE GONNA DESTROY THE ENEMY'S 'EYES' FIRST.
USE AARGM-ER.
ROGER!
WOO HOO
OUR NATIONAL CRISIS IS OVER! WELL DONE EVERYONE!
The End
HOURS LATER
YES, OUR JOINT ALLIANCE OPERATION HAS COMPLETELY DESTROYED THE ENEMY FLEET.
THERE ARE NO RECOGNIZABLE ENEMY FORCES LEFT.

IBCS Interconnectivity and interoperability are key also connects allies

In this episode, reinforcements from an ally come rushing in to support the Defense Force. The challenge faced is "alliance information sharing." In order for multiple countries conduct a joint operation together, the communication network, information system, and command and control system must connect everyone in a unified manner, beyond just the chain of command depicted on a paper plan.

Interconnectivity and Interoperability

Whether it's telephones and radios for voice and/or digitized data communications, interconnectivity and interoperability are important. The term "interoperability" is often used in a casual manner when talking about the US-Japan alliance, however this isn't simply a matter of using the same equipment. Let's confirm the meaning of the terms here.

Interconnectivity

First, interconnectivity means that multiple systems can be connected and communicate with each other. To achieve this, communication conditions must be aligned.

First, the communication medium must be the same. If one side uses wireless communication and the other side uses wired communication, interconnectivity obviously cannot take place. And whether wireless or wired, the frequencies must also be the same in communications utilizing electrical signals. These various electrical conditions are called "electrical interface."

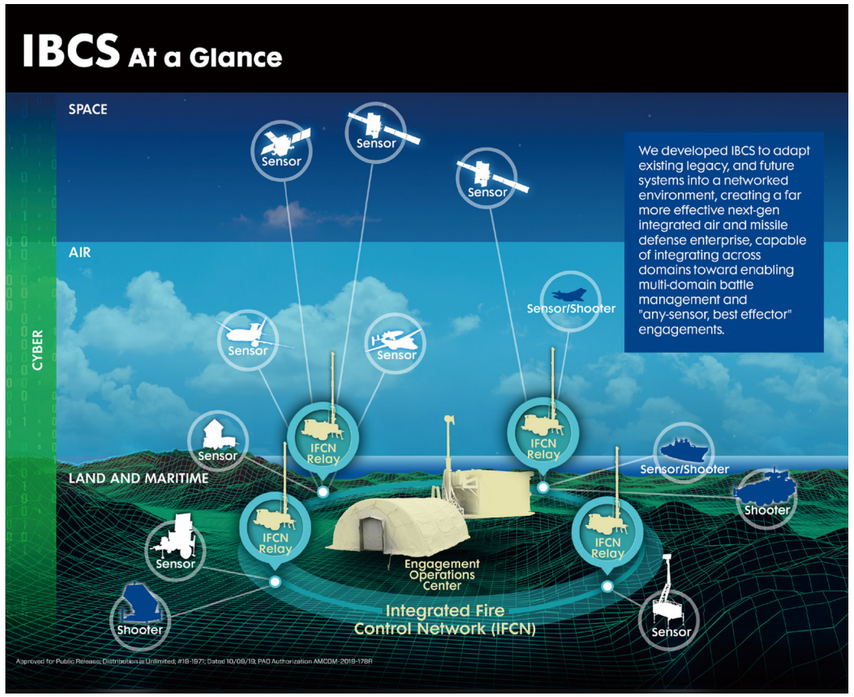
Next, a process called "modulation" is required to convert data into an electrical signal. The modulation method must also be the same to allow communication. In other words, as a necessary setting, the frequency and modulation method must at least be the same in the case of analog communication. Think of it like listening to a radio: when you have an FM receiver tuned to 82 MHz frequency, you cannot listen to an AM radio broadcast on 1,440 kHz.

In the case of digital communication, another issue is how to translate data and commands that come and go over the network into a sequence of "1"s and "0"s. For instance, even with the same data content, if one system processes the data as "001100" and the other writes it as "110101," communication is not possible. If both systems do not have the same specifications for processing data, interconnection cannot be established.

By aligning these various conditions, interconnectivity first becomes possible.

Interoperability

Once interconnectivity has been established, interoperability comes into play in the actual operational phase, as in whether different militaries can carry out joint operations together. To achieve interoperability, operational procedures, such as how to use communications equipment and information systems, also becomes an issue. Even the way the commands are written must be consistent, or may cause misunderstandings.



IBCS's Interconnectivity at a Glance

This graphic above is an IBCS network image by Northrop Grumman. The tent at the center is a mobile EOC; various assets deployed in land, sea, air and space transfer information via the Integrated Fire Control Network (IFCN). IBCS can interconnect with the various specific networks in existence today, such as the Multifunction Advanced Datalink (MADL) and LINK 16 for F-35A, Common Data Link (CDL) for ELINT aircraft, Cooperative Engagement Capability (CEC) for naval vessels, and Integrated Broadcast System (IBS) for information from satellites. The value of IBCS lies in that it can provide high-quality information created from unifying gathered original data back to all nodes on the network. As long as interconnectivity is established, the information can be provided back to even an allied country. (Image: Northrop Grumman)

Assets to strike air defense ships

RC-135 Rivet Joint ELINT aircraft. This aircraft comes to Kadena Air Base in Okinawa, Japan, for information gathering missions in areas such as the Sea of Japan and the East China Sea when deemed necessary. (Photo credit: U.S. Air Force)

The latest anti-radiation missile, AARGM-ER (Advanced Anti-Radiation Guided Missile Extended Range). One of its advantages is its size - fits inside the weapon bay of F-35A or C - so does not detract from the F-35's stealth capability. (Photo credit: Northrop Grumman)

F-35A stealth fighter jets are equipped with an unique advanced communication system called MADL. More than ten countries operate the aircraft other than the U.S. (Photo credit: U.S. Air Force)

FYI: Air defense ships

Upper left: U.S. Navy Arleigh Burke class Aegis destroyer
Above: Japan Maritime Self Defense Force Maya class Aegis destroyer
Left: People's Liberation Army Navy Type 052D Luyang III class destroyer
There are various kinds of air defense ships in navies around the world that pose a threat to aircraft. (Photo credits: U.S. Navy, JMSDF, Japan's Joint Staff)

Putting a Gateway between Different Systems

In reality, a variety of data link systems as well as command and control (C2) / information sharing systems are used. It is not feasible to replace those systems with a single unified system. To connect different systems to each other, a "gateway" is needed to relay and convert data and commands.

In case of IBCS, one Engagement Operations Center (EOC) is usually designated as a Gateway EOC with a gateway function to interconnect with different systems. For instance, it can interconnect with the Link 16 Tactical Data Link (note that there are two variants, one uses UHF communications within visual range and another uses satellite communications), the U.S. Navy's Cooperative Engagement Capability (CEC), and the Intelligence Broadcast System (IBS), which is used to downlink information from early-warning satellites for the missile defense system.

In other words, IBCS can interconnect with information systems and C2 systems deployed in battle spaces across land, sea, and air to access their information.

In the previous article, I mentioned JADC2 (Joint All Domain Command and Control), in which data coming from sensor networks in all battle spaces are centrally handled and, through rapid situation assessment and decision making, the most appropriate effectors in the most appropriate locations are assigned to engage in combat. To achieve this, a system with interconnectivity and interoperability across all battle spaces is required. This is what the U.S. Army seeks through IBCS.

By deploying such a system not only on the homeland but also to allied countries, a common foundation for multiple militaries to coordinate operations is established to enable joint operations under centralized information-sharing and C2.

Examples of Operational Coordination

For instance, let's consider a situation in which enemy landing forces closing in on our islands from the sea need to be repulsed by air power. We should assume that ships capable of wide-air-defense will be accompanying the amphibious forces. These ships surely pose a challenge to any air attack on the fleet.

Therefore, the first thing to do is collect and analyze the radar signals emitted by the enemy air defense ships, identifying the type of threat and location. Ideally, we want aircraft such as the RC-135 Rivet Joint ELINT aircraft in the air behind the front lines. What is important is how quickly the obtained data can be utilized for defense operations. The RC-135 shares its intelligence data of the enemy with IBCS via data link. Other data obtained from other sensors and intelligence-gathering assets are also shared with IBCS via data link.

IBCS grasps the entire situation based on information obtained in this way and orders F-35As and F-35Cs carrying anti-radiation missiles to strike an air defense ship sailing at a given location. Once the anti-radiation missile destroys the enemy ship's fire control radar, the ship will lose its air defense capability. Then, friendly forces including fighter jets and SSMs from the ground and ships can strike the enemy's amphibious forces.

Fighter jets, SSM units on land, and ships are deployed in different domains. For them to engage together effectively, there must be centralized command and control, and systems to implement it. Only then will all domain networked warfare become possible.