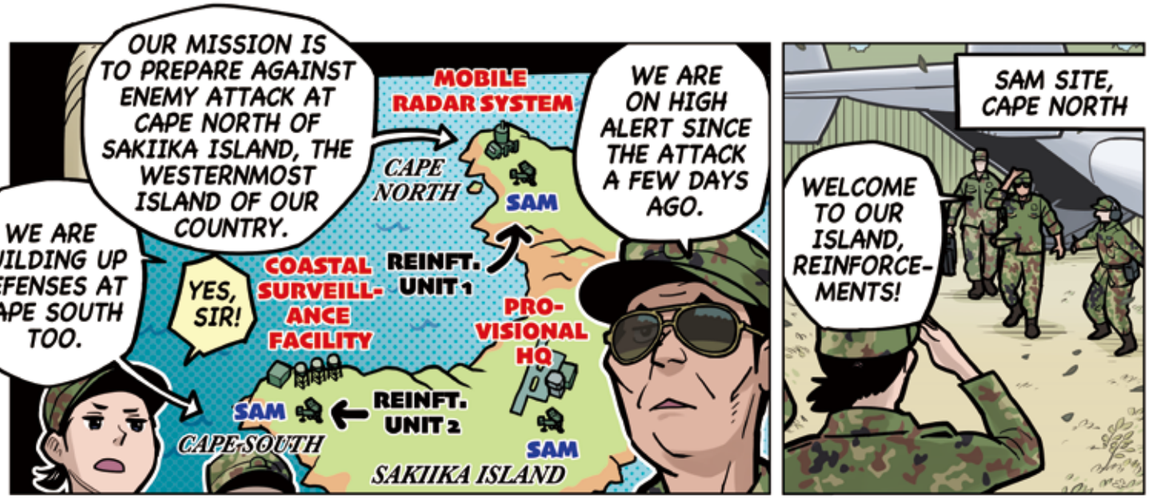
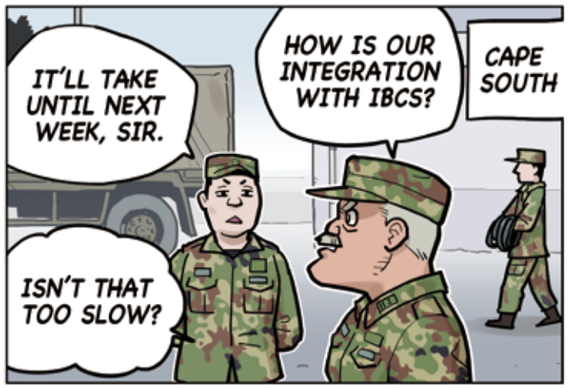
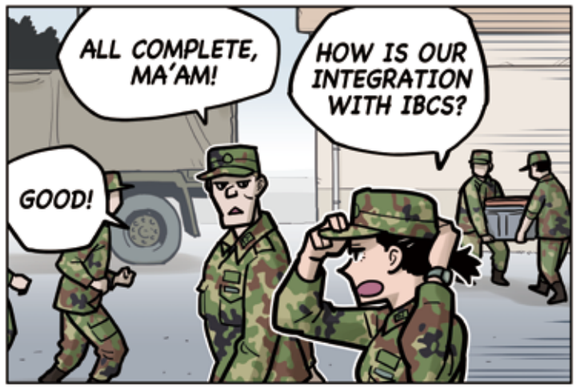
Episode 2:

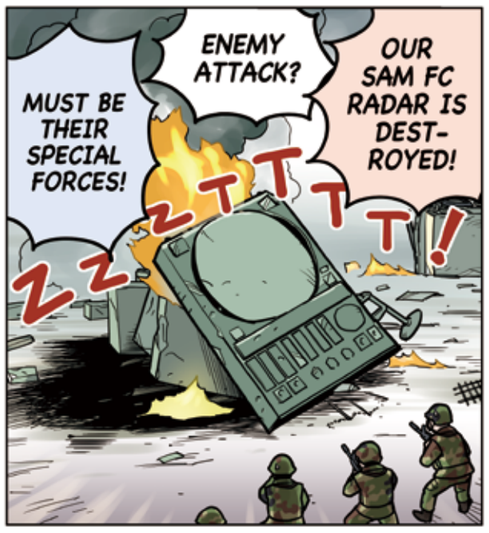
With and Without: Networking Plays Pivotal Role in Dawn Raids

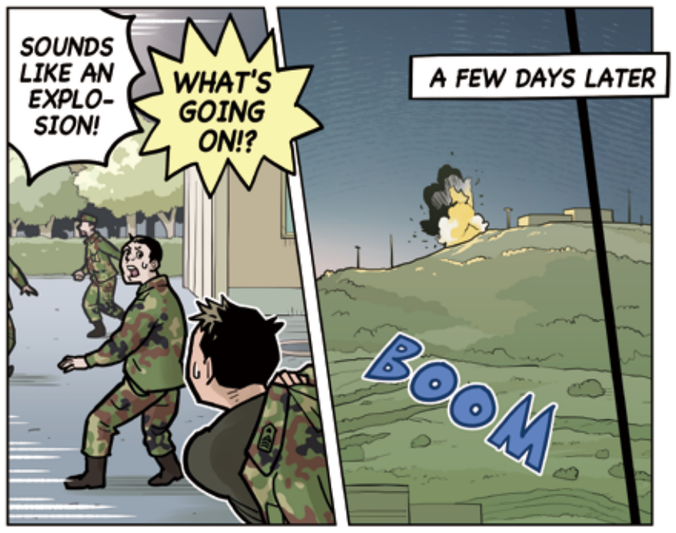
It was a bolt from the blue for the Ikaros Islands—a sea-based missile attack that shattered peace in the archipelago. Everyone can guess exactly who is responsible for the strike. But the enemy has not shown themselves yet. The Ikaros Defense Force focuses on urgently enhancing its air defenses with SAM unit reinforcements dispatched from the mainland.











COULD IT BE AN AIRPLANE?
I CAN HEAR SOMETHING ROARING.
CAPE SOUTH
VOOO..M
FIRE!
MISSILES WITHIN RANGE.
CAPE NORTH
KA-BOOM
BOOOM
BOOOM
INTERCEPT SUCCESS!
WHOOMM
FAR WEST OVER THE OCEAN
WE'LL BE IN HUGE TROUBLE IF WE ARE ATTACKED NOW.
IT'S NO USE. RADAR IS NOT WORKING...
CAPE SOUTH
IT'S THE ENEMY! CAN WE INTERCEPT?
TWO MISSILES INCOMING!
CAPE NORTH
OH NO...!
YES, SIR!
HURRY UP AND FIX THE RADAR, REPORT OUR SITUATION TO HQ AND REQUEST SUPPORT!
TARGETS LOCKED-ON!
DO IT!
YES, WE CAN!
CAPE SOUTH UNIT HADN'T BEEN INTEGRATED WITH IBCS...
MAIN ENEMY ATTACK IS YET TO COME.
ORDER ALL UNITS TO INTEGRATE WITH IBCS ASAP!
To be continued...
WE INTERCEPTED SEVEN, BUT ONE HIT THE CAPE SOUTH COASTAL SURVEILLANCE FACILITY.
OUR SAM FC RADARS WERE DESTROYED AND EIGHT CRUISE MISSILES WERE FIRED AT OUR SITES.
ATTENTION!
WE HAVE JUST BEEN ATTACKED BY THE ENEMY.
CONDUCTING RESCUE OPERATIONS,
RRAARRRAARR
ARRR
WHILE SEARCHING FOR THE ENEMY.
VOOOOOOOM

IBCS Networking made the difference supplements combat capability

In Episode 2, defenders were again saved by Northrop Grumman's IBCS. "Resilience," the theme of this episode, is defined in a dictionary as the "power to regain one's energy." In the world of weapons systems, it should be called the "ability to regain combat capability."

How to Recover Combat Capability

In Episode 1, we saw that by networking multiple search radars and fusing and combining the data, you can obtain highly accurate detection data that can be used not only for simple search but also for targeting.

This episode also explains the meaning of networking radars, but the highlighted IBCS capability is that by networking your existing sensors, you can obtain data from surviving sensors - even if some are destroyed. This means that your combat capability becomes more resilient (i.e., able to recover faster), because you can avoid a situation of being completely blinded.

What would happen if the air defender is set up to engage threats only by using its own radars, fire control systems, surface-to-air missiles, anti-aircraft guns, or other weapons (called "effectors" in industry parlance) to search for, acquire and track threats? The destruction or loss of function of even some of these components would make engagement impossible or difficult. In the manga, this is the story of the Cape South, which had not yet been connected to the network and hence could not intercept an incoming missile, resulting in a strike on the facility.

In an actual conflict, it is not realistic to plan operations based on the assumption that no combat damage will occur. In this episode, the air defense radars were destroyed by enemy special operations forces, but the air defense system could very well have been attacked by anti-radar missiles. In other words, it must be assumed that an adversary will plan to launch anti-radar missiles to destroy our radar systems.

Could a spare radar be prepared in case another is destroyed? If the spare radar is concealed and kept turned off during the early stages of an attack, it could contribute to radar redundancy. However, the defender must move and transport surplus equipment, making units less mobile. In addition, it would be time-consuming to deploy the concealed radar and connect it to the command-and-control system.

Networking Compensates for Lost Functionality

This is where achieving resiliency through networking becomes key. Multiple radars deployed in remote locations, and air defense systems under their control are networked to share data with each other. In this way, instead of having a spare radar on hand, redundancy can be achieved by mutually supplementing radars and effectors. This way, even if, for example, a search radar is destroyed due to enemy attack, search capability can be expected to be quickly restored.

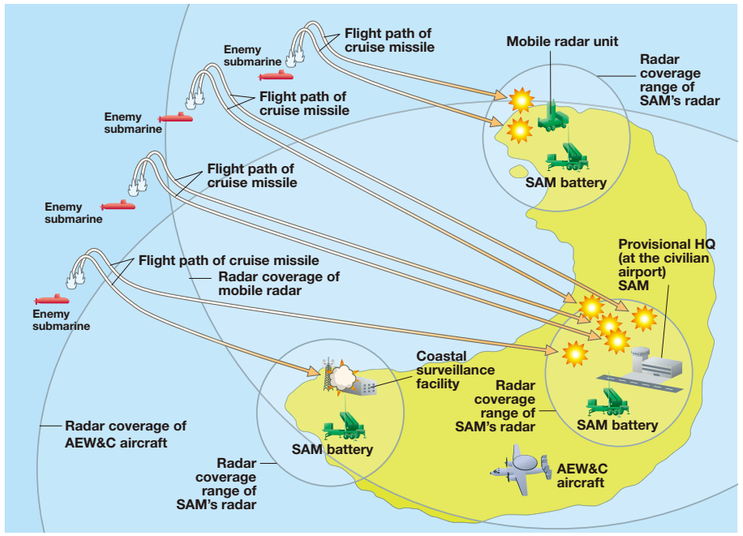
Of course, this would not be the case if all radars were destroyed at the same time. However, if they are networked, they can complement each other. Furthermore, all radars don't necessarily need to operate at the same time. In other words, multiple radars with overlapping search ranges can be prepared, and the following measures taken.

— Operate only some of the radars instead of all of them.

— Randomly change the activated radar at different times.

— Move the radar to a different location once turned off and before activating it again.

These measures would confuse the enemy, making it difficult for them to locate the radars.



The Attack and Interception in This Episode

In peace time there is just a coastal surveillance unit on Sakiika Island, the westernmost island of the country. But following the previous attack, reinforcement units have been deployed from the mainland; a provisional HQ and SAM battery are set up at the civilian airport, a mobile radar and SAM battery on a high rise at Cape North, and a SAM battery at Cape South where the coastal surveillance facility is located.

The provisional HQ, mobile radar unit and SAM batteries at provisional HQ and Cape North, as well as AEW&C aircraft (E-2D) were already connected to IBCS, but the SAM unit at Cape South was not.

Immediately after enemy special operations forces destroyed the SAM's FC radars at both Cape North and South, enemy submarines launched cruise missiles.

The SAM batteries at provisional HQ and Cape North, connected to IBCS, successfully intercepted the incoming missiles utilizing shared data from the mobile radar unit and E-2D provided through IBCS. However, at Cape South (which was not connected to IBCS) the SAM battery failed to detect the incoming missiles and the surveillance facility was hit.

Aircraft and equipment in this episode

Northrop Grumman's AEW&C Aircraft E-2D Advanced Hawkeye
Flying at a high altitude of several thousand meters, the E-2D's radar can cover hundreds of kilometers, well beyond what ground-based air defense radars can see. It also has command and control functions in addition to early warning. Photo is of a U.S. Navy E-2D (Photo credit: U.S. Navy)

Mobile Radar System
Mobile radar system can be mounted onto a vehicle to deploy to any location to conduct surveillance with its radar. Photo is JASDF's J/TPS-102 mobile 3D radar system. It of an active phased array radar. The data obtained are shared through the network. (Photo credit: JWings)

Patriot Surface-to-Air Missile (SAM)
Patriot missile intercepts and destroys hostile aircraft, cruise missiles and other threats. The Patriot missile system consists of missiles, radar, fire control equipment, missile launchers, and antenna mast. Photo is a JASDF radar (right) and launcher (left). The radar is an active phased array radar capable of detecting and tracking multiple targets at once. One launcher carries 4 (PAC-2) or 16 (PAC-3) active radar guided missiles. (Photo credit: JWings)

Engagement Operations Center (EOC)
Though not explicitly depicted in the manga, IBCS's EOC was actually deployed at the provisional HQ at the airport. Since IBCS was originally designed for the U.S. army, EOC is mobile and deployable, promptly creating a command HQ at any needed location. Distributed and networked EOCs ensure high resilience, in that even if one EOC is destroyed, IBCS's function will not be lost. The EOC was hidden behind the airport building in this airport, but perhaps we'll see it in action in future episodes. (Photo credit: U.S. Army)

Another option could be to dispatch airborne early warning and control (AEW&C) aircraft to cover the hole in coverage area created when the ground-based radar is destroyed. With IBCS, air defense units on the network can receive and share data from AEW&C aircraft.

What It Means to Be Able to Move Equipment

There is one more thing that is linked to the resiliency of IBCS, stemming from its origins: its equipment are not fixed installations but can be deployed and moved to where needed. In fact, in this episode there is a scene where equipment including for IBCS and SAM battery is brought in to Sakiika Island, where there was no air defense command-and-control system infrastructure. (Unfortunately, the enemy attack occurred before network integration was complete).

To build an air defense command-and-control system in a fixed location, "real estate" such as radar sites, command posts, and communication networks connecting them are needed. While a fixed location has the advantage of allowing the construction of a large-scale, high-performance systems, it also means that consequences will be larger if damaged or that time and effort required to restore the system will be significant. Although a spare mobile radar could be prepared, it is undeniable that its capability will be comparatively lower than a system in a fixed location. Of course, it is still better than nothing.

By contrast, IBCS was originally conceived and designed as an air defense command-and-control system that could accompany mobile U.S. Army units. For this reason, deploying as a fixed facility on the ground was not considered, but possible as an option. Equipment is brought to the site where it is needed, set up, and then interconnected via communication lines. This means that an air defense command-and-control system can be deployed to and operate at any desired location.

This means that if an enemy discovers and attacks the system, the defender will not only be able to recover its combat capability via the power of networking, but can also just dismantle the site, pack up the equipment, move to another location, and reopen shop. This is also a form of resilience in the broad sense of the word. Being able to move quickly from one location to another also forces the enemy to go to the extra trouble of locating and destroying air defense units.

Resilience of IBCS Itself

On the capability of IBCS itself to recover, since it is a system that brings benefits through networking, the network, in other words the Integrated Fire Control Network (IFCN), must also be reliable.

Because the system is mobile and deployable, it must rely on wireless communications rather than wired communications. However, wireless communications could face interference from electronic attack. For that reason, the wireless communication system must be resistant to jamming. Also, on the computer side, by which information and commands are exchanged over the network, the possibility of cyber-attacks must be considered. Ideally, of course, any such attack should be repelled, leaving no room for intrusion into the system, but if something should happen, the system must be able to quickly restore functionality.

Note: IBCS's resiliency against cyber and electronic attacks will come into full play in episode 4, so look forward to reading about it there.