

Boeing's Souped-Up Super Hornet Adds Smart U.S. Navy Firepower

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James Drew, Lara Seligman

As President Donald Trump signals he may reconsider the mix of F-35Cs and F/A-18s for the carrier air wing of the 2020s and beyond, Boeing is pitching an upgraded "Block 3" Super Hornet designed to add firepower and act as a smart node on the U.S. Navy's future network.

While the service's first F-35Cs will come online in 2018, the F/A-18 E/F Super Hornet will make up at least half of the carrier air wing through the 2040s. The challenge is to keep the Super Hornet, an airframe originally designed in the 1990s, relevant and effective against advanced threats into the middle of the century.

That issue is nothing new for Boeing, but the discussion about the next step for Super Hornet has shifted in the past few years. While the "Advanced Super Hornet" Boeing proposed in 2013 focused on stealth, the new and improved Block 3 is designed to optimize the Navy's integrated network architecture, says Dan Gillian, Boeing F/A-18 and EA-18 program manager.

The big question for the carrier air wing through the 2030s, says Gillian, is: "How can the Super Hornet evolve in a complementary way with the E-2D [Hawkeye] and Growler to help address some of those carrier gaps?"

Boeing believes the Navy could detail a plan to procure the Super Hornet Block 3 as soon as the fiscal 2018 budget proposal, expected later this spring. A fiscal 2019 buy would mean Boeing could have aircraft off the production line in the early 2020s, Gillian notes.

The revived conversation about the advanced Super Hornet is emerging just weeks after Trump made headlines by pitting the naval strike fighter against Lockheed Martin's F-35. In a blow to Lockheed, he asked Boeing to price out the cost of building a "comparable" Super Hornet as a possible alternative to the F-35C carrier variant, and Secretary of Defense James Mattis has since ordered a review comparing the two aircraft.



Boeing is pitching an upgraded Super Hornet "Block 3" for the U.S. Navy. Credit: Boeing

However, Gillian would not say definitively whether Block 3 could replace the F-35C in the carrier air wing. Boeing is focused on "complementary capability," and ultimately the Navy will decide the right mix of each platform, he stresses.

"We are supporting Block 3 as a key piece of solving the carrier air wing capability problem," he says. "Our job is to present solutions to solve their warfighting problems."

Gillian envisions a Block 3 Super Hornet working in tandem with the stealthy F-35C, Growler's full-spectrum jammer and E-2D's early-warning capability to dominate the skies. The addition of a long-range infrared sensor (IRST) will allow Block 3 to detect and track advanced threats from a distance, while conformal fuel tanks (CFT) will extend range by 100-120 nm. The CFTs are designed to replace the extra fuel tanks Super Hornets currently sling under the wing, reducing weight and drag and enabling additional payload.

These changes allow a fully loaded Block 3 Super Hornet to operate in conjunction with a stealthy F-35, providing air cover and greater magazine depth.

"You can have an F-35 in its very stealthy way doing a deep-strike mission with Super Hornet providing air superiority at that same range, or you can have Super Hornet carrying large standoff weapons that F-35 cannot carry, with F-35 providing some air cover," Gillian says. "You get very mission-flexible, so range is important."



Boeing's latest advanced Super Hornet pitch includes additional weapons capacity, long-rangeIRST and conformal fuel tanks. Credit: Boeing

Certain features of the 2013 proposal, such as the enclosed weapons pod and internal IRST sensor, were dropped from the 2016-17 package because Boeing's analysis determined the Super Hornet was "stealthy enough"—it can fly full-up and still be survivable. Boeing engineers found they needed to make design compromises to significantly reduce the aircraft's radar cross-section—for instance, by restricting payload.

"At some point we drew a line that would allow us to be stealthy enough in a balanced survivable way to be effective, and that is what we think we have," Gillian says. "The F-35 is a stealthier airplane, but we have a balanced approach to survivability, including electronic warfare and self-protection."

Block 3 also features an advanced computing infrastructure designed to take advantage of the future carrier air wing's sophisticated sensor architecture. The aircraft will have an advanced cockpit system with a large-area display for improved user interface, a more powerful computer called the Distributed Targeting Processor Network (DTPN), and a bigger data pipe for passing information known as Tactical Targeting Network Technology (TTNT).

TTNT is already a program of record for Growler and E-2D, and DTPN is also fielded on the Growler.

"You have your IRST sensor, you have other sensors in the carrier air wing, you need a big pipe to move that information around, then you need a big computer to be able to fuse all that information together," Gillian says. "Block 3 Super Hornet needs to be a smart node on the network capable of crunching and passing data across the network to other assets."

This advanced computing architecture ensures the Super Hornet, Growler and E-2D can talk to each other and pass critical threat data over the same network in combat. However, the F-35 is not on TTNT; rather it uses the smaller-bandwidth Link 16 network to pass and receive data from fourth-generation aircraft.

The result is that while the F-35C can communicate with the rest of the carrier air wing, passing large amounts of data may be more difficult.

While improving fifth-to-fourth generation connectivity is an ongoing discussion, "I think the question is: how does F-35 plug in with everybody else?" Gillian says. "If everybody else is on TTNT, there seems like an obvious answer there."

The Navy could probably add TTNT to the F-35's Link 16 functionality, but the fighter cannot broadcast on any Link 16 waveform without compromising its stealth, because Link 16 is not a low-probability-of-intercept waveform. The F-35 can pass large amounts of data to other F-35s via the stealthy Multifunction Advanced Data Link, which most other aircraft cannot currently access.

Another difference between the 2016 and 2013 offerings is that Boeing is offering to deliver a 9,000-hr. airplane straight off the production line, Gillian says. Combined with the company's ongoing effort to extend the existing Super Hornets to 9,000 hr. from 6,500, this will help the Navy maintain inventory and boost readiness, he says.

Although the Navy has not publicly committed to Block 3, Gillian thinks the service is very interested in the capability.

"I believe there is a general acceptance of the fact that we need to advance the Super Hornet, because it is going to be a front-line fighter [from the] 2020s into the '40s," Gillian says. "We believe we have good alignment on the Block 3 Super Hornet systems that address key carrier air wing gaps in a complementary way with the F-35, E-2D and Growler."