

**Chapter 6 | Network Architectures—Indoor Architecture ISP-1:**  
*Dedicated Home-Run*

This architecture is the traditional deployment approach to providing a dedicated, low fiber count SIPRNet/JWICS drop to individual users, workstations, conference rooms, or offices. In this architecture, the workstations or offices that need SIPRNet/JWICS access are not located inside of a SCIF or CAA, so access points must be protected in a hardened enclosure that is secured by the GSA-approved high-security padlock.



*Typically, a PDS is required when dedicated SIPRNet/JWICS cables are being routed through an LCA or UAA (Uncontrolled Access Area), or traversing a general use hallway.*

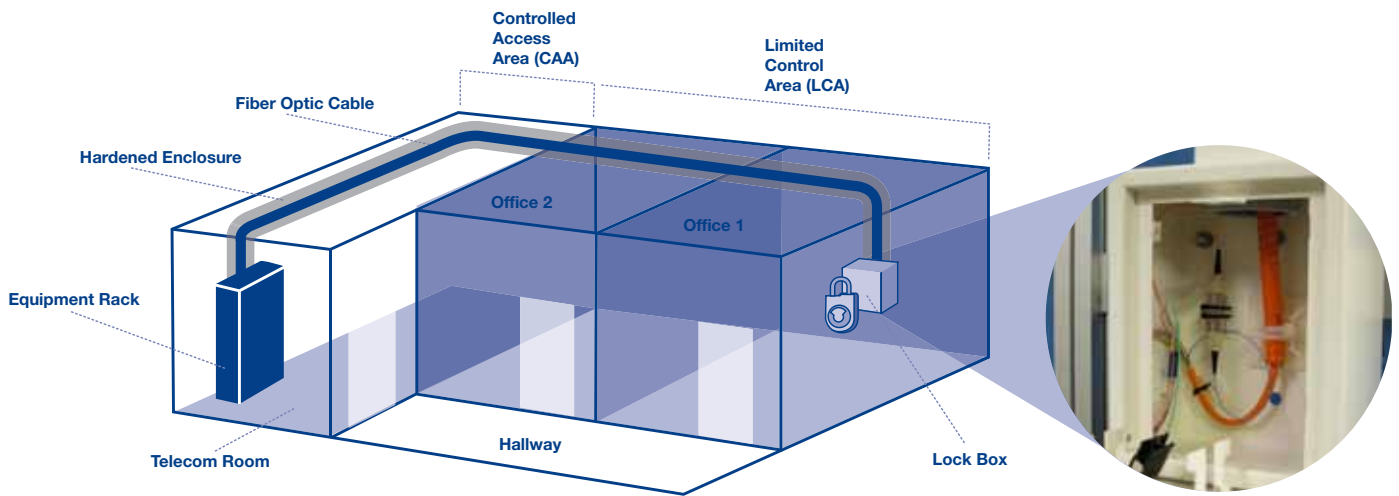


Figure 14: Dedicated home-run architecture

**Primary Applications**

SIPRNet/JWICS access requirements for many buildings or facilities usually include only a small number of offices or workstations initially. These preliminary needs are easily supported by installing a dedicated fiber optic cable point-to-point between the telecommunications closet—or SIPRNet/JWICS switch—and the end user workstation. Alternatively an IPS can be used in place of the Telecom Room.



*This architecture is ideal for voice-over-SIPRNet deployments that require separate, dedicated network drops to comply with the DISA Security Technical Implementation Guidance (STIG) for real-time voice/video network services.*

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### ***Design Considerations***

When designing a network using this Dedicated Home-Run architecture, there are three primary design considerations:

- 1. Protecting the SIPRNet/JWICS network equipment**
- 2. Determining the fiber count of the workstation cables**
- 3. Protecting the SIPRNet/JWICS access points**

#### *Consideration 1: Protecting the SIPRNET/JWICS Network Equipment*

Many facilities do not have a red/black equipment room or even any areas that meet CAA criteria. For these scenarios, the use of an IPS container is highly recommended as a quick and cost-effective way to provide SIPRNet/JWICS network access without having to undergo costly and intrusive facility modifications. For those facilities that do have existing red/black equipment rooms or CAAs, the SIPRNet/JWICS and INTERCEPTOR equipment should be installed in them.

#### *Consideration 2: Determining the Fiber Count of the Workstation Cables*

In addition to the number of fibers required for data transmission, two dark fibers in each workstation cable should be allocated and dedicated to the INTERCEPTOR for alarmed monitoring. This can be accomplished by either (1) adding two additional fibers to the number of lit and spare fibers, thus allowing you to use a regular INTERCEPTOR unit and simply loop the fibers inside of the workstation lockbox, or (2) using some of the spare fibers for INTERCEPTOR monitoring in order to reduce the fiber count of the workstation cables and the initial deployment cost, but at the same time accepting the risk that you may need to purchase RTUs for the workstation enclosures if you ever need to light up the spare fibers initially used by INTERCEPTOR. (The latter approach also requires an INTERCEPTOR+Plus unit for future scalability).



***Adding a few extra fibers to each workstation cable adds only pennies per foot to the cost of material, and it also reduces deployment costs by enabling the use of regular INTERCEPTOR units.***

***Keep in mind that the most expensive part of any network deployment is the labor and installation. Planning for future growth through dark or spare fibers is absolutely critical.***

#### *Consideration 3: Protecting the SIPRNET/JWICS Access Points*

The home-run workstation cables must be terminated in a hardened enclosure according to NSTISSI 7003 requirements. An important decision is whether to have one enclosure per workstation, or alternatively to have multiple workstations using a single hardened enclosure, such as in the context of adjacent cubicles or open area workcenters, for example.

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**Deployment Cost Analysis Example**

A military unit needs to deploy SIPRNet to four offices in its operations facility, each with 3 SIPR workstations. The offices are not inside of a SCIF or CAA. Each office needs a minimum of four fibers for SIPRNet connections, and the military unit expects that other SECRET level networks (e.g., CITRIX, COALITION, etc) may be required in the future. Further, it would like to have 50% spare fibers for future requirements.

Based on the requirement of four fibers for SIPR and another four fibers for future growth, the workstation cables will either be an 8-fiber or 12-fiber cable. The table below highlights the differences between adding dedicated fibers as opposed to using spare fibers

	<b>Adding Dedicated Fibers</b>	<b>Using Spare Fibers</b>
<b>Interlocking Armored Cable Fiber Count</b>	12	8
<b>Interlocking Armored Cable Cost Per Foot</b>	\$1.30	\$1.20
<b>Total Cost for Workstation Cables (150 ft. per Drop)</b>	\$2340	\$2160
<b>4 Port INTERCEPTOR Unit</b>	\$19,000	X
<b>4 Port INTERCEPTOR+Plus Unit</b>	X	\$27,000
<b>May Require Future Purchases or RTUs</b>	X	\$30,000
<b>INTERCEPTOR Equipment Cost</b>	\$21,340	\$59,160
<b>Total Installed cost for 12 Workstations</b>	<b>\$1,800/drop</b>	<b>\$2,400/drop today (without RTUs)</b>
<b>Total Installed cost for 12 Workstations when RTUs are required:</b>		<b>\$4,900/drop</b>

Table 5: Deployment cost analysis example

**INTERCEPTOR Alarmed Carrier PDS Components/Options**

As evidenced by the table above, even after adding the extra fibers to the workstation cables, dedicating fibers for the INTERCEPTOR system remains the cheapest solution and negates the need for the future potential purchase of RTUs for the workstation enclosures. As long as it is certain that two fibers will always be dedicated to INTERCEPTOR monitoring, standard INTERCEPTOR units can be deployed. However, if there is any uncertainty or concern that those fibers may be needed in the future, then investing in an INTERCEPTOR+Plus unit future-proofs your network and negates the need to buy a new INTERCEPTOR+Plus unit to replace your originally purchased unit. Therefore, if all of the fibers in the drop cable feeding a workstation need to be activated an RTU can be installed at that time eliminating the need to replace the INTERCEPTOR with a new INTERCEPTOR+Plus.

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***INTERCEPTOR Alarmed Carrier PDS Components/Options***

If there are dark fibers in the workstation drop cable, a fiber loopback can be installed behind the faceplate at the workstation. By doing so the SIPRNet/JWICS fibers terminate into the faceplate, but the alarmed fibers are looped behind the faceplate, thus making the INTERCEPTOR system completely transparent to the end users.

By also leveraging the CTTA approval to use interlocking armored cable as part of an INTERCEPTOR system, the dedicated workstation drops can be run above the ceiling or below a raised floor. The armored cables can be deployed from the telecommunications closet by using j-hooks or wire basket for cable management and support.

Since the workstations are located in an LCA, the INTERCEPTOR alarmed PDS cables must be terminated into a hardened enclosure that meets NSTISSI 7003 requirements; therefore, a GSA approved padlock must secure the enclosure.



*In order to streamline installation, you can make use of a pre-fabricated hardened workstation enclosure with a one-inch conduit chimney as depicted in the diagram below. This makes routing the armored cables from the ceiling or floor to the hardened workstation enclosure less difficult and drastically reduces the complexity of trying to fish the cables through walls or other obstacles, as well as adds to the aesthetics of the workstation.*

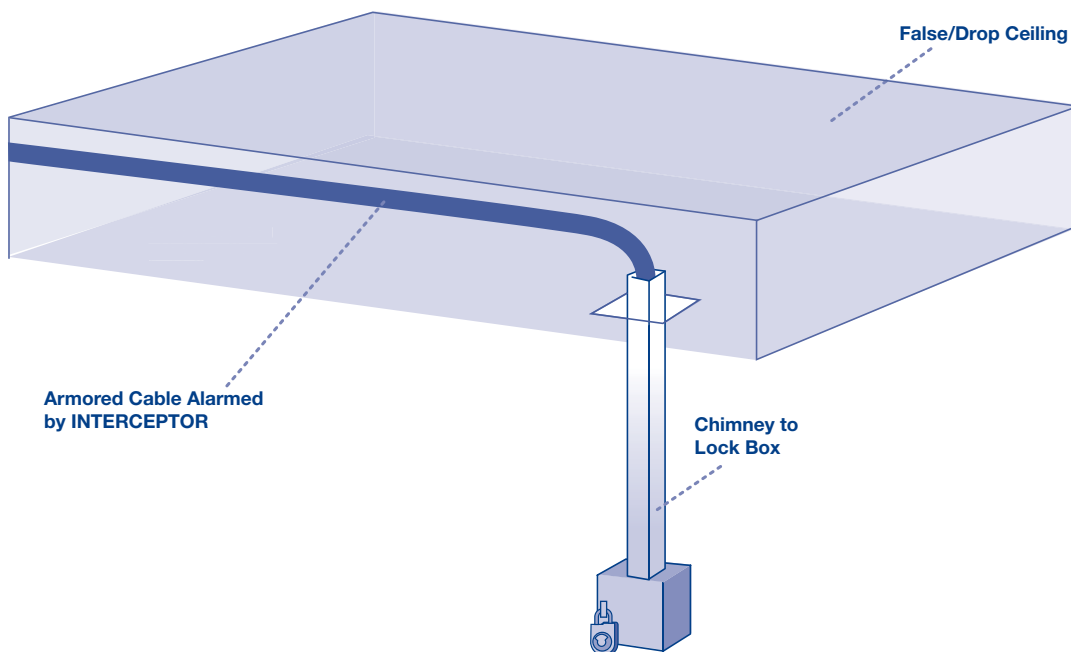


Figure 15: Dedicated workstation drop from ceiling using armored cable

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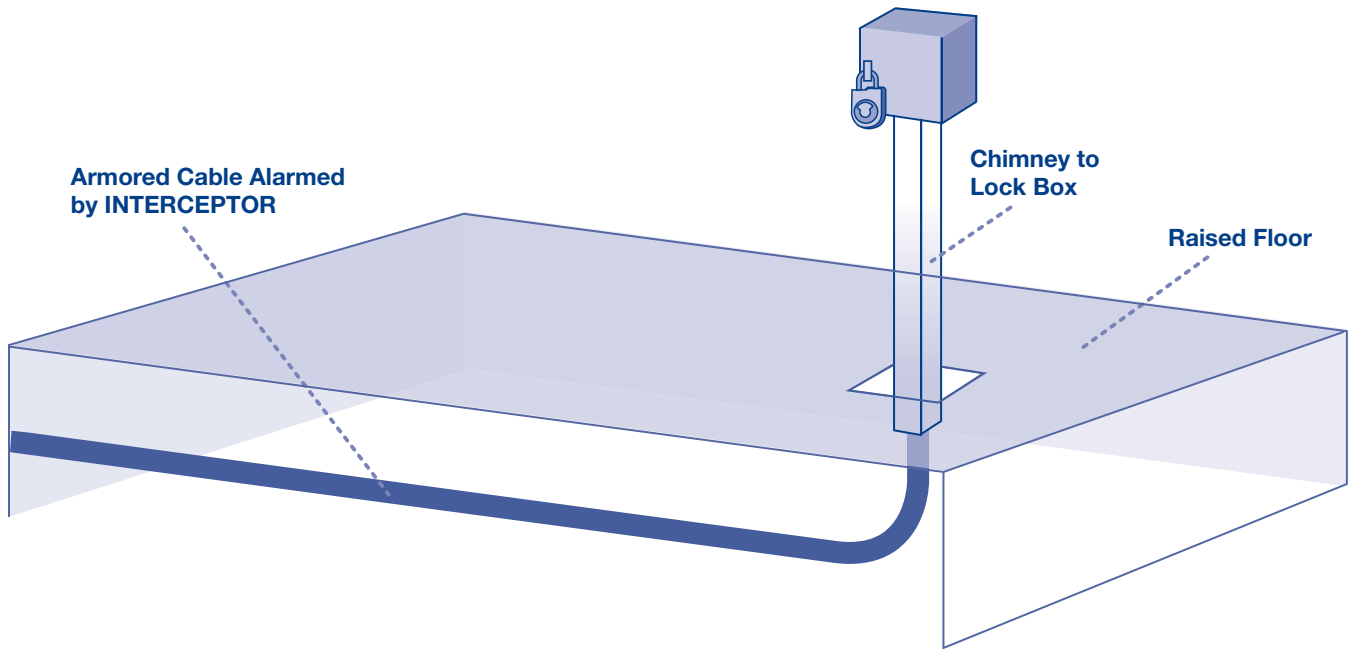


Figure 16: Dedicated workstation drop from floor using armored cable

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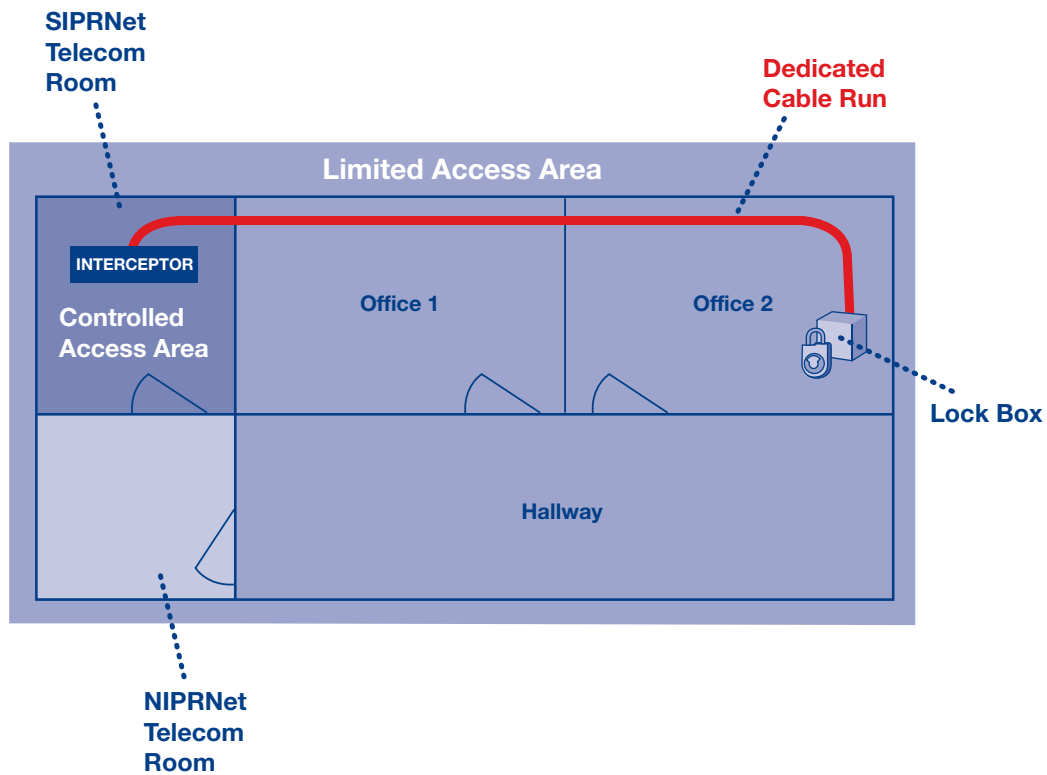


Figure 17: Dedicated home-run architecture design example

**Scalability of INTERCEPTOR Equipment**

In this architecture, one INTERCEPTOR port is used to protect one workstation cable. Thus, as new workstation requirements emerge, an equal number of INTERCEPTOR ports will need to be added to protect those new cables. (A 4-port INTERCEPTOR unit will protect 4 workstation drops).

If INTERCEPTOR+Plus units were initially deployed, and you currently need to light up all of the fibers in your workstation cables, you can purchase RTUs on a workstation-by-workstation basis to eliminate the need to pull in higher fiber-count cables.