DESIGN STANDARD
FOR

Picatinny Common Lethality Integration Kit (CLIK)

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REVISION STATUS

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XC-working	2025-04-25	Version 2 Working Copy. Revised from Interface Control Document to Design Standard.	
2.1	2025-09-17	Interim Release: Updates/Refinements based on comments and working group meetings.	

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1. SCOPE

1.1. PURPOSE

Rapid proliferation of Unmanned Aerial Systems (UAS) at all echelons of combat operation has introduced new capabilities for the Warfighter to deliver decisive overmatch and obtain freedom of maneuver across multiple domains. The pace of technology of UAS far exceeds any legacy military platform and associated acquisition lifecycle. UAS lifecycles will trend shorter with greater and more frequent technological platform upgrades. To minimize burden of integration at each platform upgrade, modular lethal payloads must have a common interface and architecture for attachment, power, communication, and safety critical commands. The desired end state is seamless interoperability of the UAS, the modular lethal payload, and the ground station controller.

Combat Capabilities Development Command (DEVCOM) Armaments Center (AC) is developing a platform agnostic, Picatinny Common Lethality Integration Kit (CLIK) to weaponize low-cost, attritable UAS. The purpose of this standard is to minimize the proliferation of physical and electronic interface standards on the UAS and the proliferation of physical and electronic interface standards on the payloads. The goal is to enable a soldier to move, mix and match different payloads on different platforms, without requiring a certification for each combination.

This document provides the base concepts, architectures, requirements, and overview for defining the required interoperability of Picatinny CLIK Ecosystem of packaged payloads. This document has been developed with existing reference architectures such as the Modular Payload Design Standard (MOD Payload) and small universal payload interface (sUPI) in mind. The intent is for this document to augment existing reference architectures with a focus on lethality integration and interoperability. Additionally, airworthiness and system safety certifications have influenced the standard with the intent to reduce burden associated with those certifications both to the user and to the developers.

1.2. SYSTEM OVERVIEW

This document specifies interoperability concepts, architecture, and requirements associated with integrating unmanned systems and lethal/nonlethal payloads. The capabilities addressed within this design standard relate primarily to lethal/nonlethal weapon payload interoperability with respect to payload integration, operation, control and status. To the degree possible, capabilities have been broken down into subsets to cover integration of specific interfaces/technologies associated with the integration of lethal payload technology.

A payload is a physical device that interfaces to the UAS. A payload can be similar in nature to other devices that are integrated on a UAS platform, but a payload is not required for native UAS capabilities. Frequently payloads are integrated into the platforms in a very specific way which isn't always transferable to other platforms using physical, power, and data interfaces. CLIK will define where the boundary between platform and payload exists permitting rapid integration as well as interoperability. Modular and interchangeable payloads will enable warfighters to select the most efficient effect based on mission needs. Figure 1 depicts a notional diagram for the domain context that Picatinny CLIK supports.

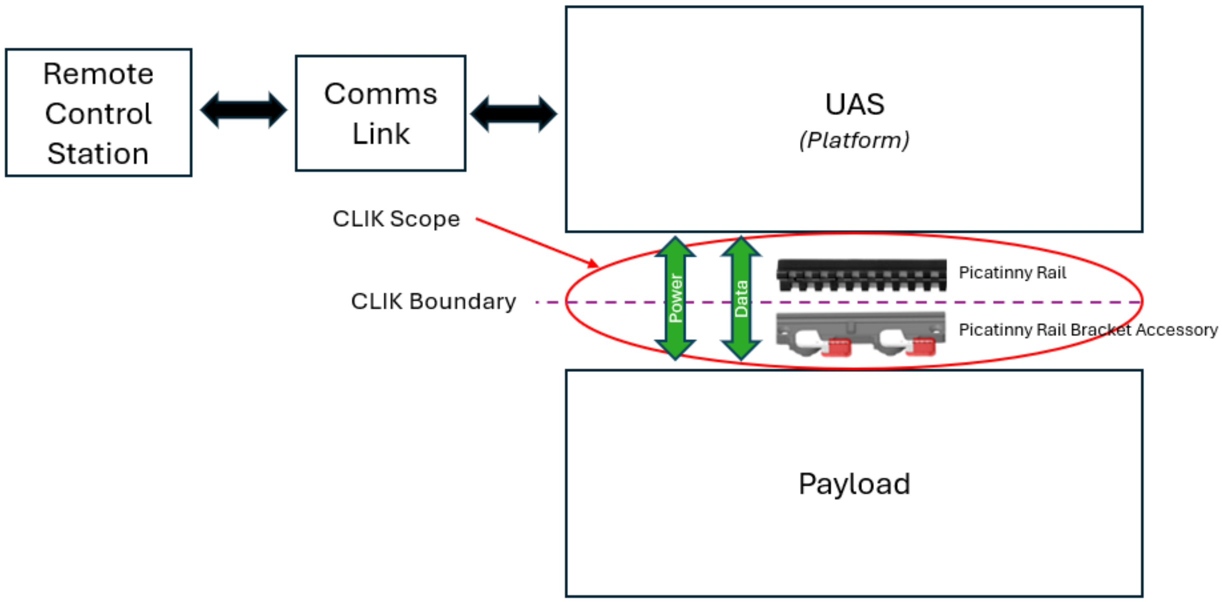


Figure 1 – Picatinny CLIK Domain Context

1.3. PICATINNY CLIK INTEGRATION LEVEL APPROACH

The Picatinny CLIK Ecosystem has a tiered (i.e. phased) approach to the capabilities it provides. There are four integration levels. However, at this time, the design standard is focused on integrating Picatinny CLIK to platforms in active prototype and experiment with DoD components and does not fully describe Integration Level 4, the highest level of integration. The intent of integration level approach is to augment and assist Airworthiness configuration certifications in the future.

Integration Level 1 Integration: In this initial phase, Picatinny CLIK provides a physical interface only for Payload System connecting to the rail(s). The Payload System has all the subsystems (which may include communications, power, sensors, command and control) required for full operation with no dependence on the Platform including its own Ground Control Station.

Integration Level 2 Integration: In this second level, the Picatinny CLIK provides a power interface between the Platform and Payload systems that can be used. The Payload system would still maintain its own Ground Station.

Integration Level 3 Integration: In this third level, the Picatinny CLIK adds interfaces for communications (i.e. Radio, Command and Control (C2)) between the Platform System to the Payload System that can be used. The payload C2 software would be integrated on the Platform Ground Control Station.

Integration Level 4 Integration: In this fourth phase (which is not fully described in this design standard at this time), the Picatinny CLIK adds interfaces for sensors between the platform to the payload system that can be used. This would be the full integration and interoperability of the Payload and Platform Systems. The Payload system may contain its own sensors as desired (to increase accuracy or supplement Platform sensors).

2. APPLICABLE DOCUMENTS

2.1. GOVERNMENT DOCUMENTS

MIL-STD-1913		Dimensioning of Accessory Mounting Rail for Small Arms Weapons
MIL-HDBK-338B		Electronic Reliability Design Handbook
MIL-STD-464D		Electromagnetic Environmental Effects Requirements for Systems
MIL-STD-1472H		Human Engineering
MIL-STD-882E		Systems Safety
MIL-STD-130N		Identification Marking of U.S. Military Property
MOD Payload		A Modular Payload Design Standard Revision 6.1

Table 1: Government Documents

2.2. NON-GOVERNMENT DOCUMENTS

IEEE 802.3u		IEEE Standard for 100BASE-T (Fast Ethernet) and 100BASE-FX (Fast Ethernet over Fiber)
IETF RFC 768		User Datagram Protocol (UDP)
IETF RFC 4632		Classless Inter-Domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan
EIA/TIA-232-F		Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
ANSI X3.4-1986		Coded Character Sets – 7-Bit American National Standard Code for Information Interchange (7-bit ASCII)
IEC 60747-5-5		Semiconductor devices – Part 5-5: Optoelectronic devices – Photocouplers
IEC 60747-17		Semiconductor devices – Part 17: Magnetic and Capacitive Coupler for Basic and Reinforced Insulation

Table 2: Non-Government Documents

3. PAYLOAD REQUIREMENTS

The following sections specify the mechanical, electrical, and protocol requirements for a Picatinny CLIK compliant payload. The majority of platforms will be able to support the mechanical, power and signal interface outlined for CLIK Payloads. Some platforms may require alternative mounting and electrical interfaces due to their size and mission profile. The small Universal Payload Interface (sUPI) is the alternative for platforms constrained by low capacity for payload size, weight, and power needs. This interface is suitable for Short Range Reconnaissance (SRR) and Purpose Built Attritable System (PBAS) type aircraft with Picatinny CLIK compliant payloads. The initial sUPI and ecosystem components have been transitioned to DEVCOM AC for incorporation into Picatinny CLIK and will be an additional addendum in future revision.

3.1. MOUNTING/PHYSICAL INTERFACE

The physical interface requirements listed in this document describe which standards should be used. This does not ensure that a particular mounting(s) will support a payload, provide stable mounting, or provide the proper vehicle dynamic characteristics. It is the responsibility of the lead system integrator and payload developers to ensure that these characteristics are met, and pass testing, in a particular implementation.

3.1.1. PICATINNY RAIL

CLIK payloads shall be capable of mounting to a single rail or multiple rails in accordance with MIL-STD-1913. Connection coupler(s) of varying length not less than 5” in length and then 5” on-center (OC) from side to side up to the maximum width of the UAS mounting structure. The number of rails required to mount a payload is determined by the payload developers for proper payload mounting and spacing considerations. The payload must go through proper analysis of anticipated flight profiles and maneuvers. This data will need to be provided so that integrators can make informed decisions when integrating a payload onto a platform.

3.1.2. PICATINNY RAIL BRACKET ACCESSORY

The Picatinny CLIK interface brackets shall be compatible with MIL-STD-1913 type accessories and ideally toolless in design. If tools are required, a standard issue military multitool, such as a Leatherman pocket survivor tool or similar, is maximally allowed. It must have a redundancy feature for secondary means of attachment to ensure adequate clamp strength for static and dynamic loads, positive control and prevent dislodging or detaching during standard flight conditions. A notional example of a toolless bracket accessory is shown in Figure 2.

The Picatinny Rail Bracket Accessory shall have a maximum length of five inches.

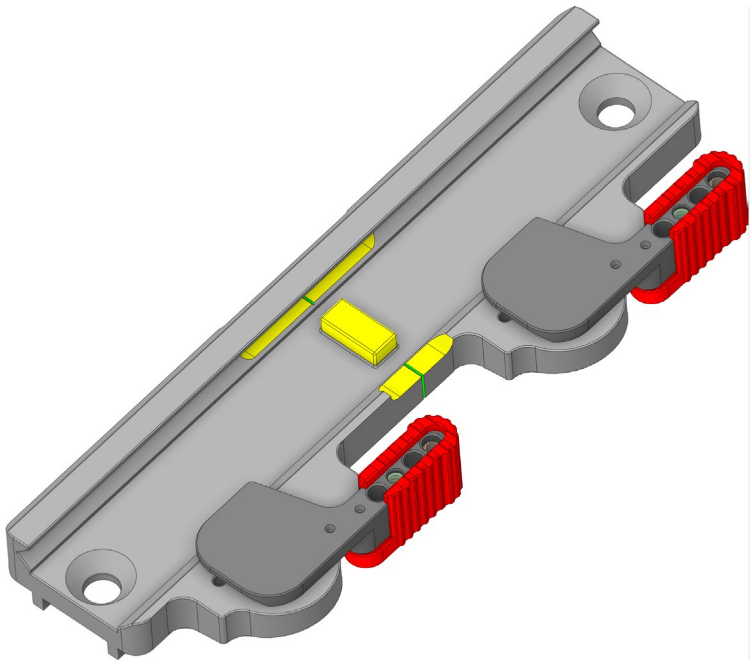


Figure 2 – Notional Bracket Accessory

3.1.3. PICATINNY RAIL BRACKET MARKING IDENTIFIER

The minimum height of a Picatinny Rail is governed by MIL-STD-1913. The maximum height of the rail space claim on the payload is a 0.4" slot opening along the entire length to allow the payload bracket to be placed anywhere along the rail (see Figure 3).

3.1.3.1. MARKING

The mounting bracket shall incorporate a marking indicating the payload's center of gravity (CG). This will permit integrators to align payload CG with the platform CG. For Platform marking requirements, see 4.1.1.

3.1.3.2. WEIGHT

The physical properties of the payload and mounting system must be described.

The payload connection system must withstand a maximum 5G acceleration in all directions during platform maneuvers.

3.1.4. CLIK UNIT

A CLIK Unit defines the base logical requirements for interoperability between a Payload System and a UAS Platform. Platforms possess finite resources related to weight, size, power, and data throughput. A CLIK Unit represents the expected boundary conditions for a single Payload System. While the physical dimensions of a CLIK Unit are expected to evolve as this design standard expands, the core principle remains consistent: to ensure interoperability.

1 CLIK Unit (1CU) nominally defined as 4.25" Wide, 12.75" Long and 1" High. A payload that exceeds these dimensions must be labeled as a *W*x*LxH* CLIK Unit Payload, where L defines the space claim along the length of the rail, W defines the space claim perpendicular to the rail and H defines the space away from the surface of the rail. For example, a payload 18" long, 3" High but within the standard width would be a 1x1.5x3CU Payload (round up to the nearest tenth of a CU).

The payload shall have a clearance of 1.0"x0.40" minimum center aligned at the top of the payload container as seen in Figure 3 to allow appropriate clearance for rail.

The required space claim for soldier access to notional bracket attachment mechanism is depicted in an example configuration in Figure 3 (will vary depending upon specific rail attachment method).

The payload shall come up with a launch and recovery platform or integrate a mechanism to permit launch and recovery into the payload if the payload volume is larger than the platform can support (i.e. provide legs or provisions for payload to sit on ground if platform legs are too short or nonexistant).

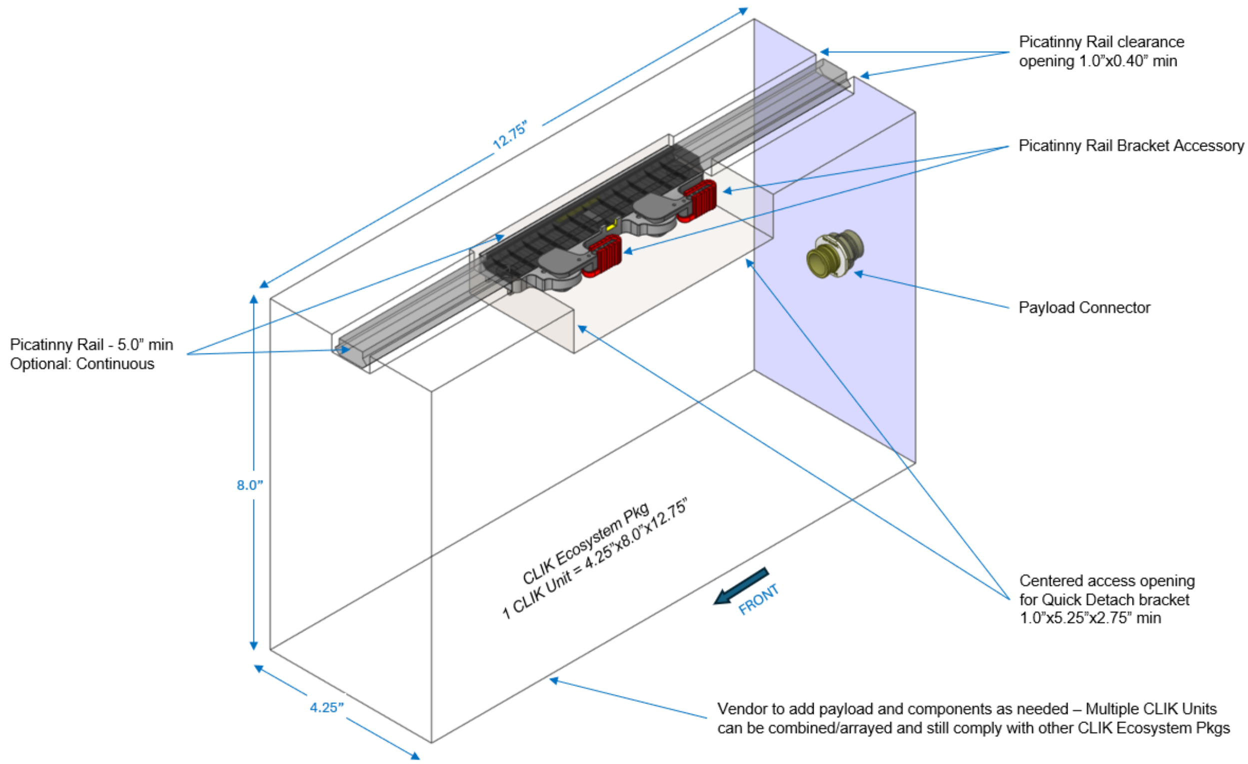


Figure 3 - Picatinny CLIK 1x1x8 CU Nominal Space Claim Example

Figure 4 shows a notional example of a CLIK Unit structure.

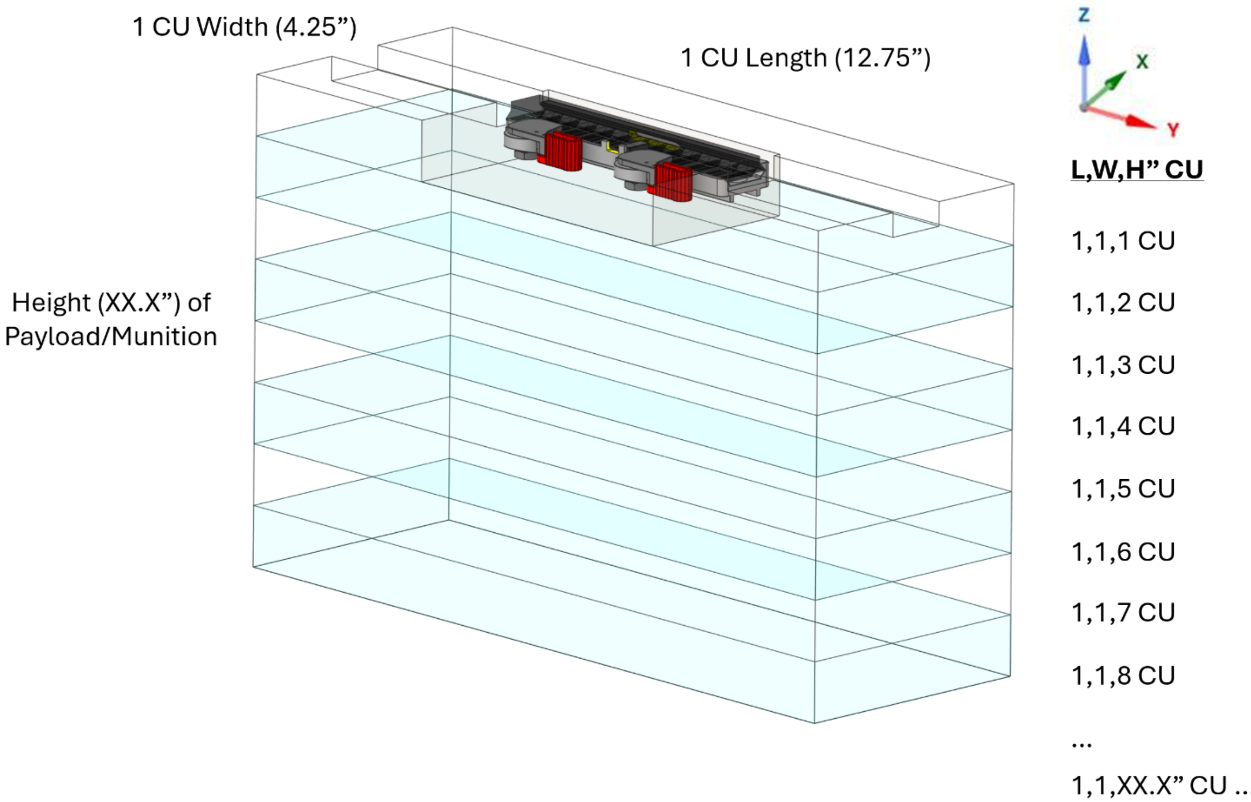


Figure 4: CLIK Unit Example for payload height in inches

3.1.5. PICATINNY CLIK ECOSYSTEM

3.1.5.1. SINGLE PICATINNY CLIK PAYLOAD

A CLIK Payload operating in standalone has greater flexibility of deployment than one that must operate with other CLIK Payloads (notional examples are shown in Figure 5 and Figure 6)..

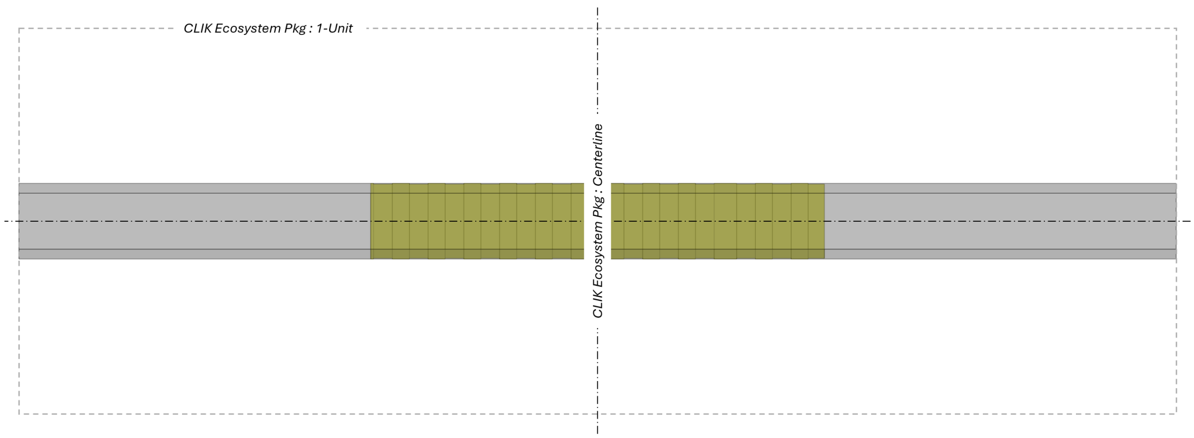


Figure 5 – Single Picatinny CLIK Ecosystem Package Unit

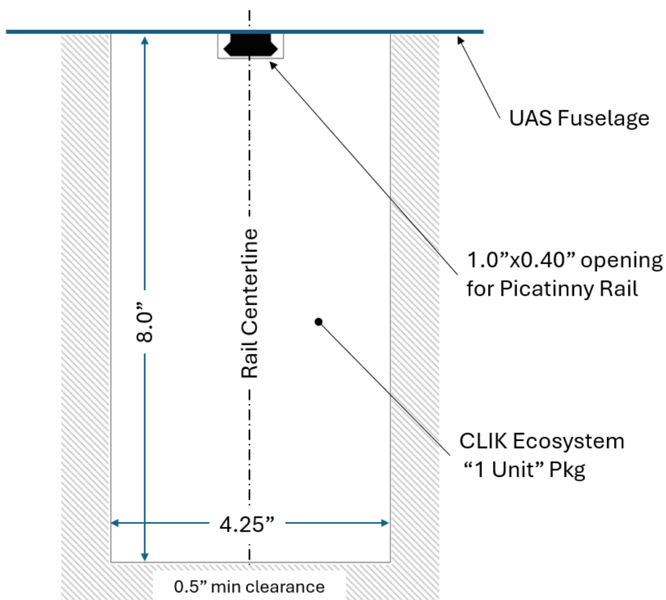


Figure 6 – Payload Clearances

3.1.5.2. MULTI RAIL ADAPTER

When a Picatinny CLIK payload exceeds the platform's single rail attachment capability a multiple rail approach is allowed to distribute loads across a greater number of rails. Shown in Figure 7 is a dual rail adapter with a mounting plate to be used on the standard 5" OC spacing, which may be the 5" minimum or continuous rail.

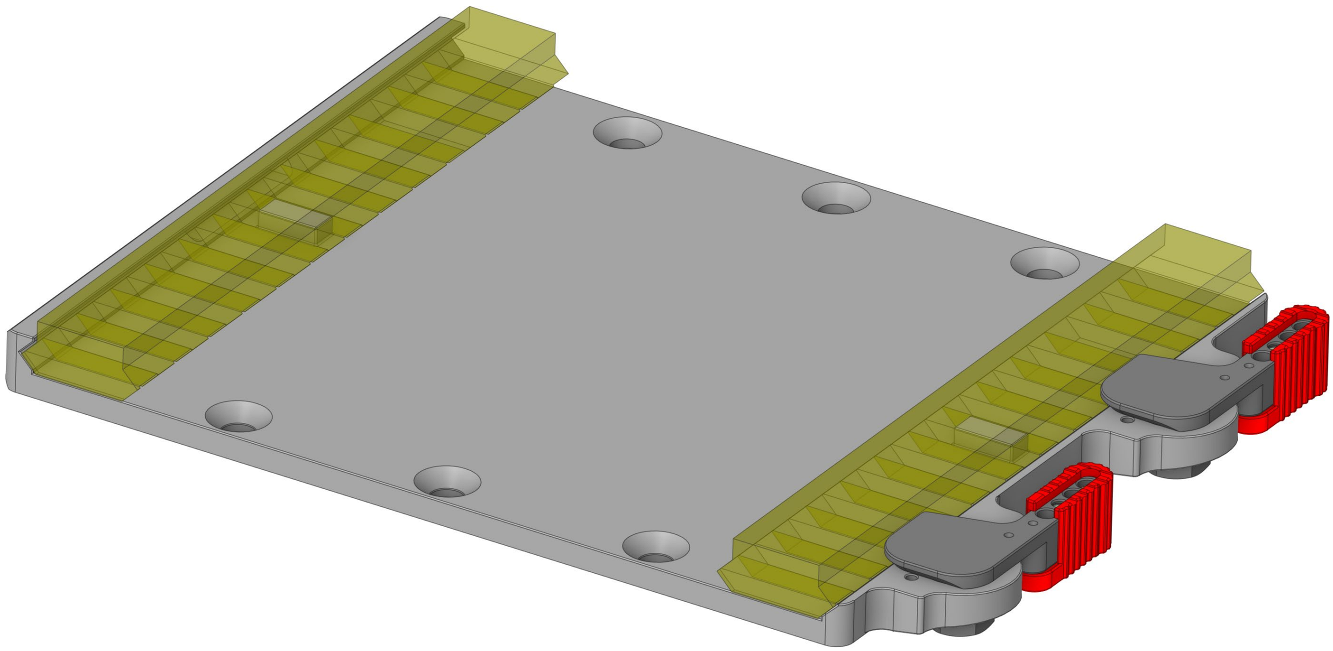


Figure 7 – Notional Multiple rail adapter

3.1.5.3. STANDARD GRID LAYOUT FOR MULTIPLE PICATINNY CLIK ARRAY LAYOUT

A CLIK Array is defined as a configuration consisting of two or more CLIK Payloads mounted in a defined grid pattern (suggested grid pattern; up to UAS to analyze whether they can conform to suggested or need an alternate configuration). This arrangement enables the integration of larger payloads or a compilation of smaller payloads. The figures that follow showcase notional examples of CLIK array configurations (Figure 8, Figure 9, Figure 10, Figure 11, and Figure 12).

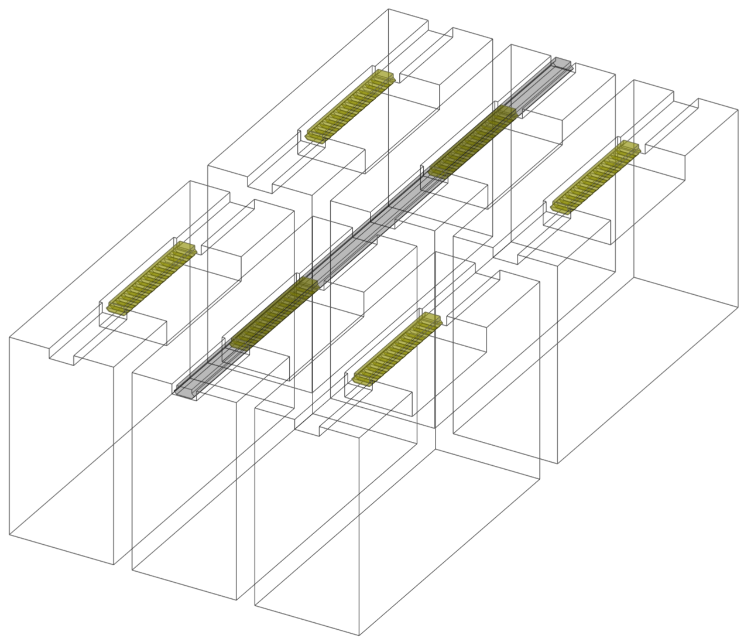


Figure 8 – Mult-Picatinny CLIK Array (2x3CU)

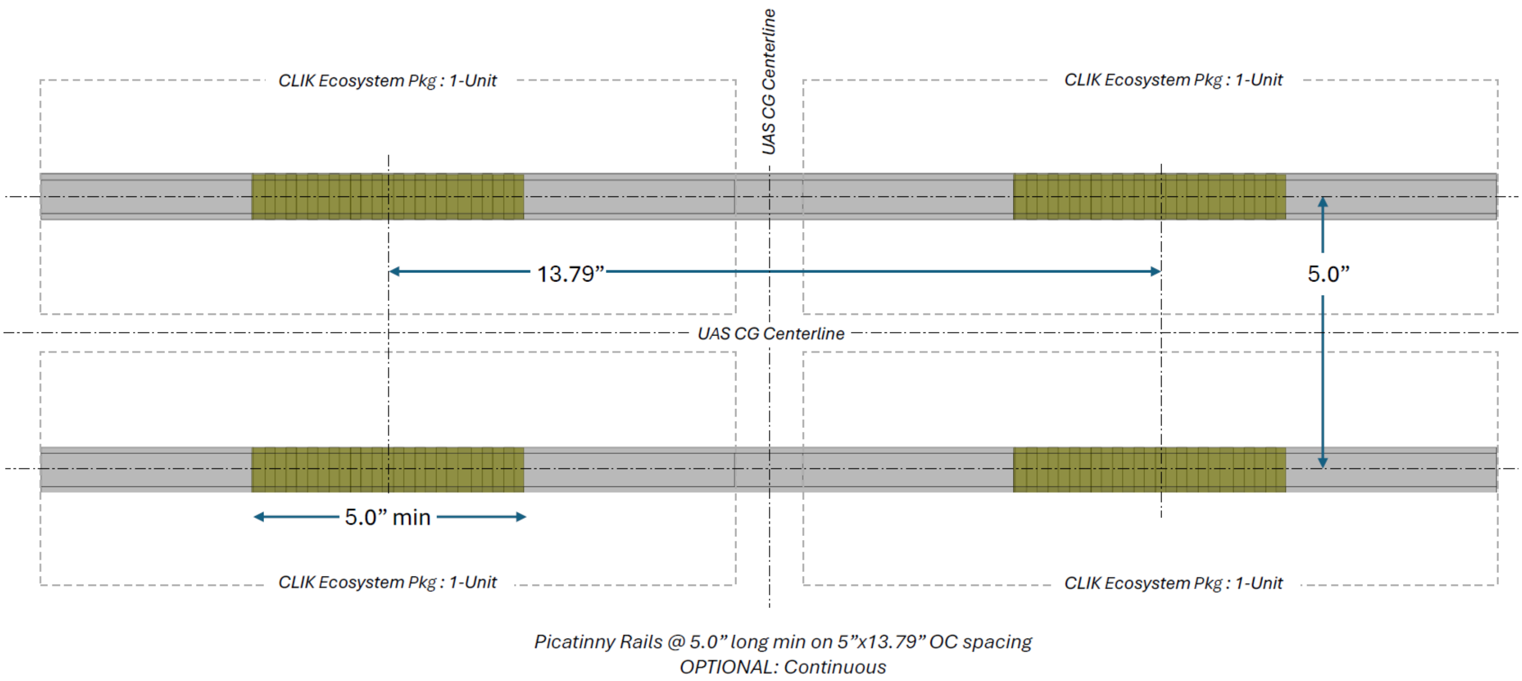


Figure 9 - Picatinny CLIK Ecosystem Package Even Array (2x2CU)

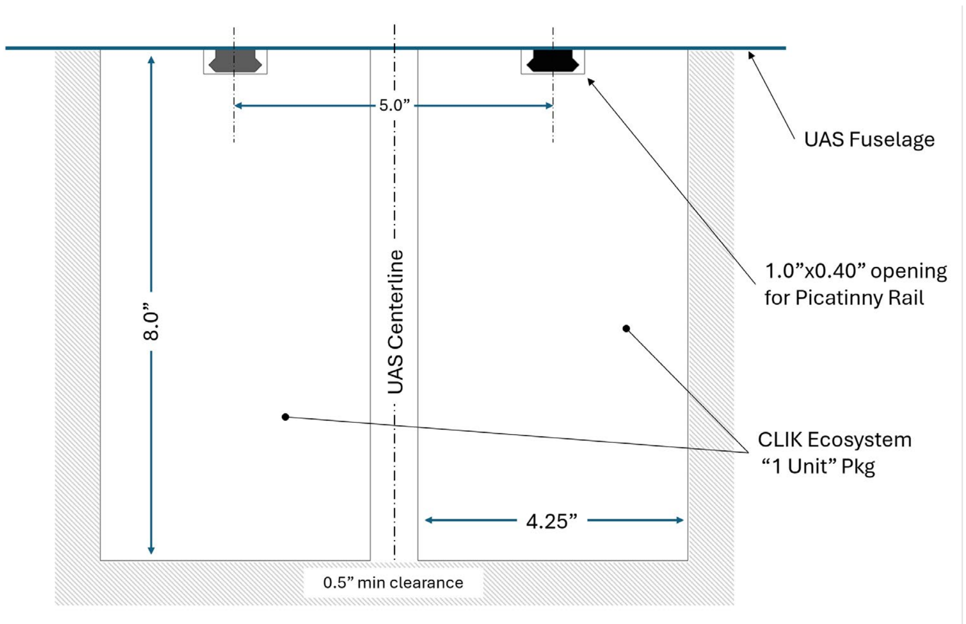
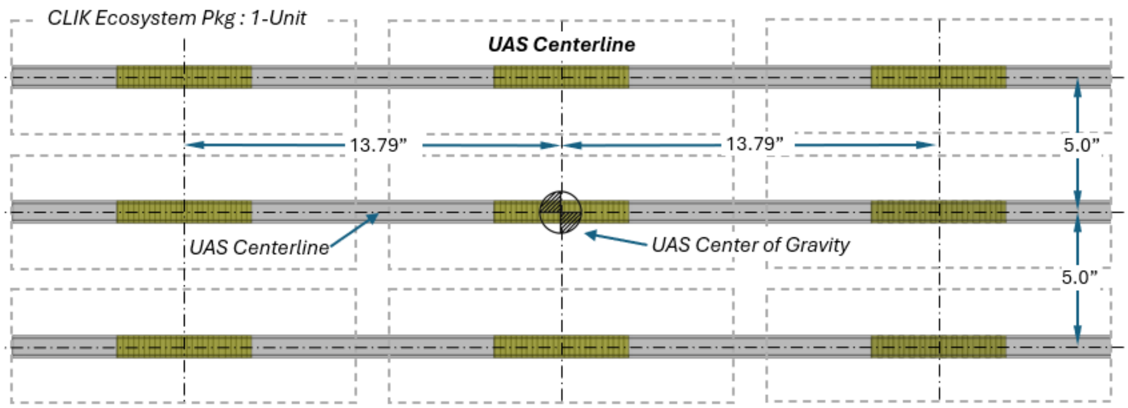


Figure 10 – Dual Rail Required Clearances

UAS unladen center of gravity will always be marked (see Figure 11) on Picatinny rails to address mounting of a single Picatinny CLIK Pkg on a UAS which can mount multiple numbers of Picatinny CLIK payloads so that a balanced load reference location can be identified.



Picatinny Rails @ 5.0” long min @5”.0 OC on short axis and 5”x13.79” OC spacing on long axis
OPTIONAL: continuous from end to end

Figure 11 - Picatinny CLIK Ecosystem Pkg Odd Array (3x3CU)

Array configuration when using a barrel type weapon in conjunction with additional Picatinny CLIK pkgs (see Figure 12).

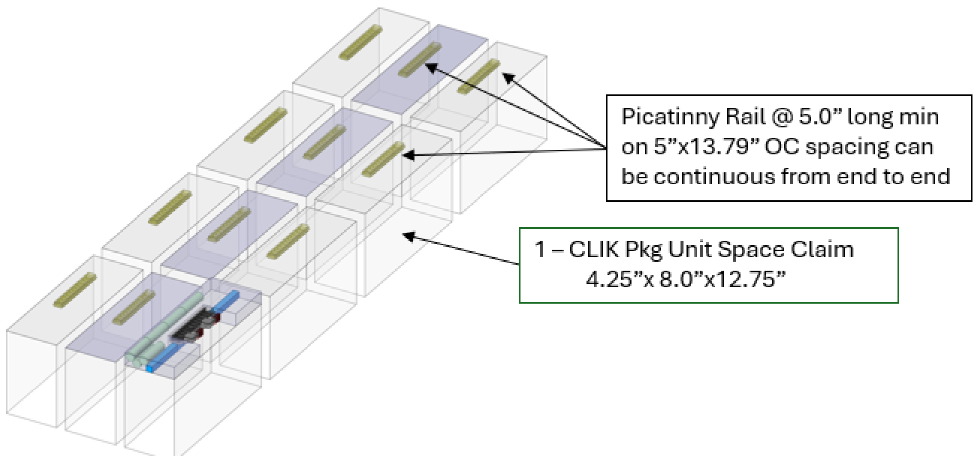


Figure 12 - Picatinny Rail layout when carrying a single long item "as shown in blue"

3.1.6. PAYLOAD HUMAN FACTORS

The Payload shall be installable onto the Picatinny CLIK System by the Soldier without the need for special tools.

The Payload shall be removable from the Picatinny CLIK System by the Soldier without the need for special tools.

All System operations regarding interfacing the Payload System to the Picatinny CLIK System performed by the Soldier shall be accomplishable when the Soldier is wearing tactical gloves.

If tools are required, a standard issue military multitool, such as a Leatherman pocket survivor tool or similar, is maximally allowed.

3.1.7. IDENTIFICATION MARKINGS

The Payload shall display a permanent identification plate with human readable text and Machine-Readable Information (MRI) in accordance with MIL-STD-130N. The identification plate shall include the following minimum information: manufacturer, part number, unique serial number, maximum payload weight in pounds to one decimal as MPW: XX.X, and maximum payload CLIK power units as MPC: XX (see 3.2.4).

3.2. POWER AND SIGNAL INTERFACE

The majority of CLIK Platforms and Payloads will be able to support or require the power and signals outlined in the following interface. Smaller UAS such as PBAS and SRR may implement the sUPI addendum. It is expected that a common ecosystem component will be developed to bridge the use of sUPI payloads with the outlined interface.

3.2.1. PAYLOAD CONNECTOR

A Picatinny CLIK payload shall integrate a single connector from the currently available options shown in Table 3 or a connector with identical form, fit, and function as detailed in sub sections below.

<table>
<tr><th>Series</th><th>Class</th><th>Shell Style</th><th>Material/Finish</th><th>Arrangement</th><th>Contacts</th><th>Keying</th></tr>
<tr><td>801</td><td rowspan="2">-009</td><td>-01</td><td rowspan="2">NF</td><td rowspan="4">9-19</td><td rowspan="4">P</td><td rowspan="4">A</td></tr>
<tr><td rowspan="2">2M801</td><td rowspan="2">-02</td></tr>
<tr><td rowspan="2">-010</td><td rowspan="2">ZNU</td></tr>
<tr><td>MD801</td><td>-07</td></tr>
</table>

Table 3: Approved Payload Connectors

3.2.1.1. SERIES

Picatinny CLIK Payload Connector shall be of the following Series options shown in Table 4.

Manufacturer	CAGE Code	Product Line	Description
Glenair, Inc.	06324	801	Mighty Mouse Double Start Acme Thread
Amphenol Corp.	77820	2M801	Micro-Miniature Dual-Start Acme Thread
Cinch Connectivity Solution Inc.	34078	MD801	MD801 Dual-Start Acme Thread

Table 4: Approved Manufacturer's Connectors Series

3.2.1.2. CLASS

Picatinny CLIK Payload Connector shall be of Receptacle Class Series options shown in Table 5.

Series	Description
-009	Receptacle with Banding Platform
-010	Receptacle with Accessory Threads

Table 5: Approved Connector Class Series

3.2.1.3. SHELL STYLE (MOUNTING)

The approved manufacturers provide various options for how the connectors mount. Figure 13 shows mounting options typically available from the listed manufacturers.

Figure 13: Receptacle Connector Typical Mounting Options

Picatinny CLIK Payload developers can select the specific option in Table 6 that best suits their application.

Shell Style	Description
-01	In-Line
-02	Square Flange
-07	Jam Nut

Table 6: Shell Style Options

3.2.1.4. MATERIAL/FINISH

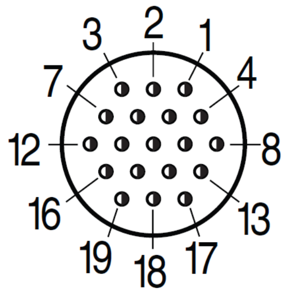
The finish type shall be selected from the options shown in Table 7.

Material/Finish	Description
NF	Aluminum/Cadmium with Olive Drab Chromate
ZNU	Aluminum/Black Zinc Nickel over Electroless Nickel

Table 7: Approved Connector Material/Finish

3.2.1.5. ARRANGEMENT

Picatinny CLIK Payload Connector shall be of Shell Size/Insert Arrangement of 9-19. Refer to Figure 14 for Contact Arrangement. Note that this image represents the front face of male (pin) contacts. Female (socket) contacts will position pins in a mirror position to the pin format shown.



9-19

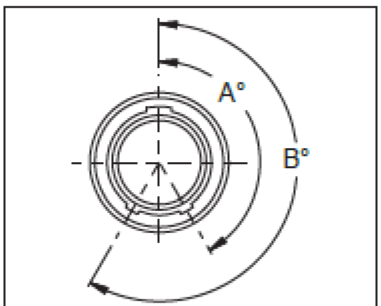
Figure 14: Payload Connector Insert Arrangement

3.2.1.6. CONTACTS

Picatinny CLIK Payload Connector shall use Male (Pin) Contacts of Size #23.

3.2.1.7. KEYING

Picatinny CLIK Payload Connector shall be keyed in the A Configuration as shown in Figure 15.



Position	A°	B°
A	150°	210°

Figure 15: Connector Keying

3.2.2. CONNECTOR PLACEMENT

The connector shall be located on the back plane of the payload. The specific location will be determined by the platform developer. A notional example is provided in Figure 16.

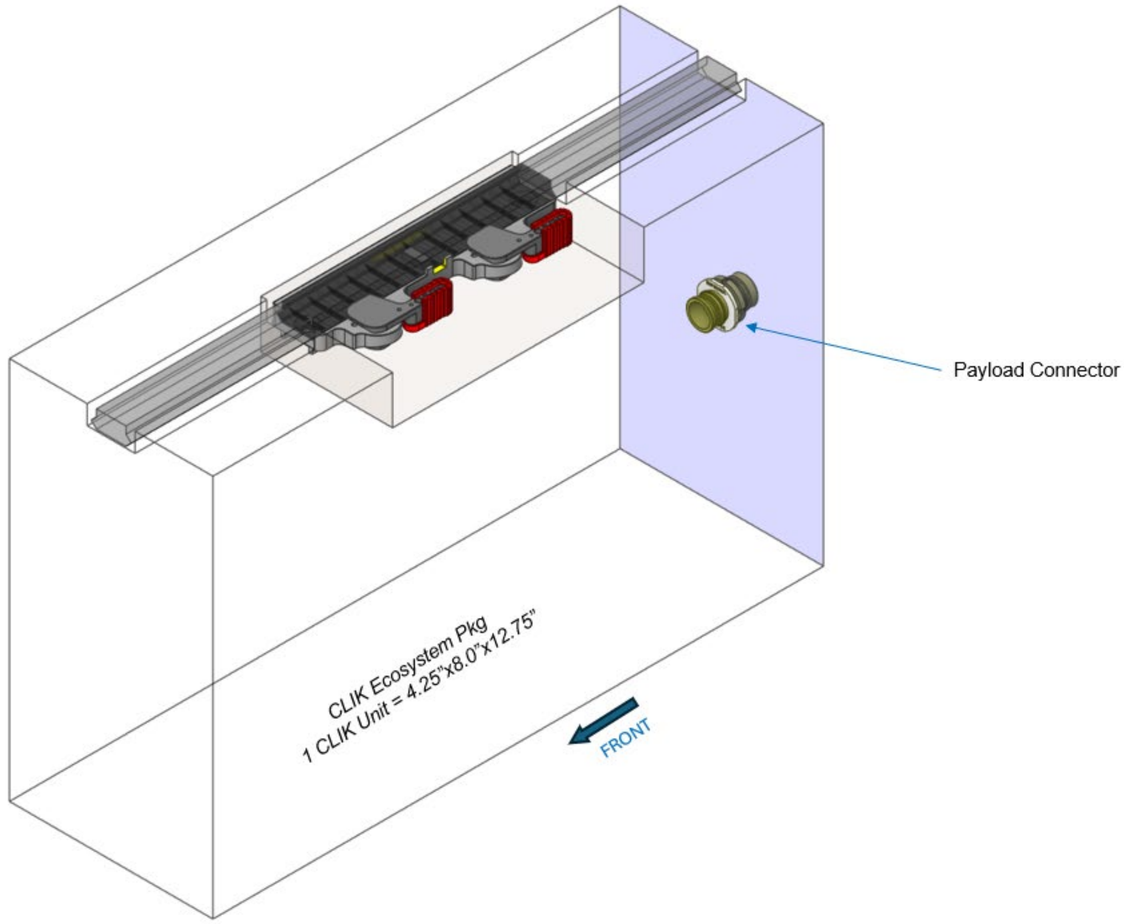


Figure 16: Payload Connector location (notionally on payload backplane)

3.2.3. CONNECTOR PINOUT

A Picatinny CLIK payload shall implement its connector pinout as described in Table 8. All signals are named from the payload perspective such that an Rx signal is transmitted from the platform and received by the payload. Pins marked as Reserved are retained for future expansion of the Picatinny CLIK design standard and shall not be used by the payload for other purposes. The connector's 9-19 insert arrangement as seen from the front face of pin inserts is shown in Figure 14.

Pin	Name	Description	Reference
1	RS232 Tx	Serial Port.	3.2.6
2	RS232 Rx		
3	RS232 Return	Return path for RS232.	
4	Ethernet Tx+ c	Ethernet Port.	3.2.5
5	Ethernet Tx-		
6	Ethernet Rx+		
7	Ethernet Rx-		
8	Power In0	Power in from the platform	3.2.4
9	Power In		
10	Chassis	Chassis bonding connection	3.2.10
11	Power Return	Power return to the platform	3.2.4
12	Power Return		
13	Safety Arm	Safety discrete signals and dedicated return path.	3.2.8
14	Safety Fire		
15	Safety Return		
16	Loopback	Loopback signal for payload detection.	3.2.9
17	Reserved	Pins reserved for future Picatinny CLIK expansion. Not to be used.	3.2.3
18	Reserved		
19	Reserved		

Table 8: Payload Connector Pinout

3.2.4. POWER

A Picatinny CLIK payload shall operate from a supplied 28 Volt (V) Direct Current (DC) power source. The payload shall remain operational under voltage fluctuation of ±5% from the nominal 28VDC. A Picatinny CLIK Power Unit (CPU) is defined as 250 milliamps (mA) per CPU. The maximum current draw permitted through the Picatinny CLIK connector shall be limited to 10 Amperes. The resulting Maximum Connector CPU (MCC) shall be defined as 40 CPUs.

Picatinny CLIK payloads shall determine their Maximum Possible Current (MPC) draw in multiples of CPUs with fractional CPUs always rounding up. Picatinny CLIK payloads shall implement overcurrent protection to ensure the payload does not draw more than its rated MPC from the platform under normal operations and possible failure modes.

A Picatinny CLIK payload shall not permit current to flow back to the platform unless the payload is specifically purposed for energy storage. A Picatinny CLIK payload designed for energy storage shall not permit more than 10A to flow through its Picatinny CLIK payload connector and shall maintain operation within the permitted 28V tolerance.

3.2.5. ETHERNET

A Picatinny CLIK payload shall optionally implement an Ethernet interface in accordance with Institute of Electrical and Electronics Engineers (IEEE) 802.3u 100BASE-TX. The Internet Protocol (IP) addressing scheme is left to the system integrator. A Picatinny CLIK payload implementing Ethernet shall permit the interface to be enabled and disabled with the default state at power on being disabled.

3.2.6. SERIAL

A Picatinny CLIK payload shall implement a serial interface IAW TIA/EIA-232-F. The recommended configuration for this port is 115,200 bps, 8 data bits, 1 stop bit, no parity, and no flow control. Deviation from the recommended configuration would require coordination with the platform providing this channel. Serial Tx and Rx signals shall be referenced to RS232 Return. The RS232 Return is permitted to be electrically connected to Power Return in the payload only.

A Picatinny CLIK payload shall implement the Payload Serial Protocol as defined in 5.2 over the serial interface.

3.2.7. FUNCTION CHANNELS

A Picatinny CLIK payload shall implement one or more function channels. Each function channel represents a function that can be activated, armed and/or fired. A single purpose payload would only require a single channel while a payload containing multiple individually actionable functions would require a function channel for each (i.e. a two grenade dropper payload would require two function channels to control each drop function independently). Functions shall be assigned a numeric value starting with 1 and incremented sequentially. A function channel shall exist in one of five states: Unavailable, Not Activated, Activated, Armed, or Firing. The Unavailable state shall indicate that the function is not available to activate (i.e. dropper has released its grenade). A function that is not in the Unavailable state shall accept commands to switch between the Not Activated and Activated states via the command specified at 5.2.5. The Armed state shall be set when a function has been commanded to the activated state, the Safety Arm discrete is active and any additional payload specific safety mechanisms are armed. The Firing state shall be set when the Armed state conditions are set and the Safety Fire discrete is active. Note that function channels are not limited to munitions. For example, an energy storage payload could be commanded to the Activated state to enable its output and would transition to the Unavailable state once its energy was depleted with the Arm and Firing states never being set.

3.2.8. SAFETY DISCRETES

A Picatinny CLIK payload shall monitor the Safety Arm and Safety Fire signals provided by the platform as defined in 4.2.1.3. A false (not armed/don’t fire) value shall be interpreted as a signal with a voltage of less than or equal to 1.5V. A true (armed/fire) value shall be interpreted as a voltage of greater than or equal to 3.5V. A Picatinny CLIK payload shall maintain the isolation requirements specified in 4.2.1.3. Safety signal current draw shall not exceed 5mA for each signal.

The shared safety discrete signals combined with the ability to enable one or more function channels provides the ability for a remote operator to select independent payloads (and their functions) via software and then arm and fire them using physical switches. Note that the safety features provided by CLIK are a component of a payload’s safety functionality but are not exhaustive. Depending on the payload, additional circuits, mechanisms, and/or commands may be necessary to safe, prepare, arm, and/or fire any associated munitions. The specific methods used to implement the full payload functionality are left to the developer, but a notional example is depicted in Figure 17 where the 28V power needed to actuate the system is gated by several switching devices in series requiring that each be enabled for the function to “fire”.

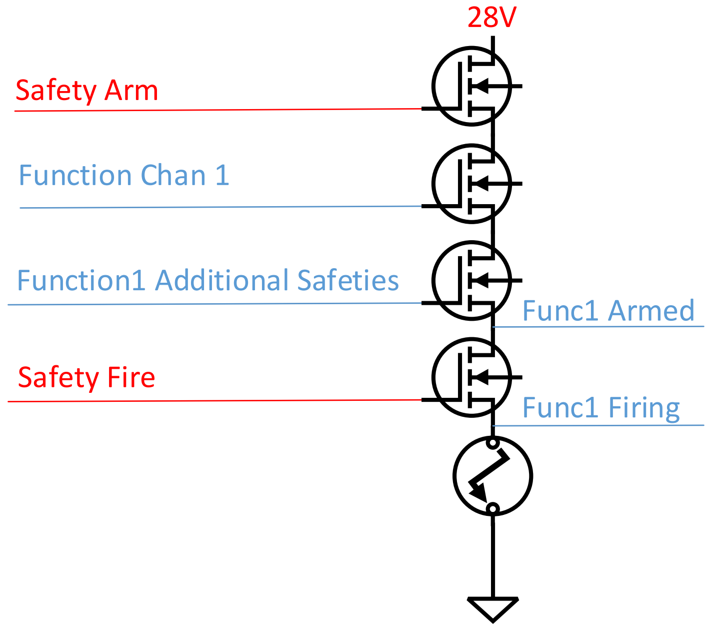


Figure 17 – Notional Payload Safety Circuit

3.2.9. LOOPBACK

A Picatinny CLIK payload shall connect the Loopback signal from the platform to Power Return with less than 1 Ohm resistance.

3.2.10. CHASSIS

A Picatinny CLIK payload shall electrically bond any conductive components of the payloads structure, shielding, connector body, and Chassis Signal pin. A Picatinny CLIK payload shall maintain electrical isolation between all electrical signals and the payload Chassis Signal.

4. PLATFORM REQUIREMENTS

4.1. MOUNTING/PHYSICAL INTERFACE

The Picatinny CLIK platform shall utilize a Picatinny rail identified in 3.1.1. They shall meet the dimensional requirements of MIL-STD-1913. Platforms shall provide adequate ground clearance for mounted payloads, as defined in 3.1.4. Use of a takeoff platform is permitted to achieve adequate clearance.

A Picatinny CLIK platform shall implement one or more Picatinny CLIK payload interfaces. Each Picatinny CLIK payload interface shall be assigned a unique numerical identifier, starting at 1 and increasing sequentially and permanently marked (1 to *n*) within three inches of its associated connector.

4.1.1. PICATINNY RAIL MARKINGS

Each singularly mounted Picatinny Rail will have the centerline identified and marked on both sides with a GO & No-GO range of locations so that the payload can be mounted and not adversely affect the flight control and operations of the UAS (see Figure 18). The UAS platform shall analyze where the best place and space of the rail(s).

The intent of this marking is to reduce, but not eliminate, burden of aircraft weight and balance calculations in an operational environment.

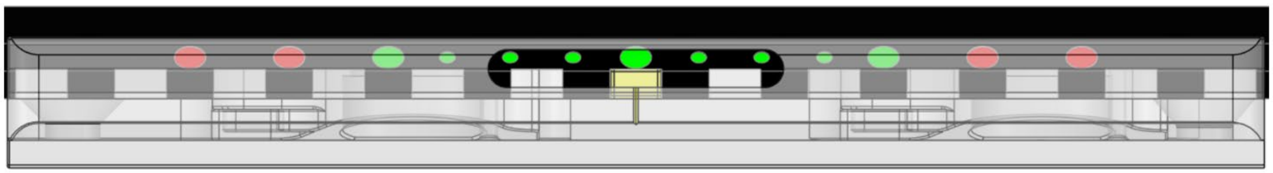


Figure 18 - Picatinny Rail w/centerline & defined GO & NO-GO markings, viewable thru Notional window design

When a singularly mounted Picatinny Rail is longer than the min 5.0" rail or continuously along the UAS mounting surface, it will have the centerline identified and marked with a range of locations that the payload may be mounted in "GO" range and additionally a "NO GO" where it would adversely affect the flight control and operations of the UAS (see Figure 19).

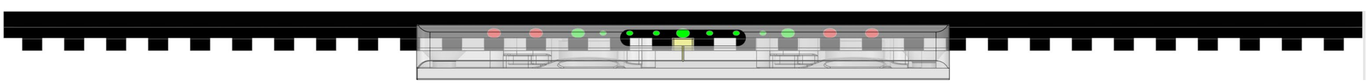


Figure 19 - Picatinny Rail longer than the min 5.0" w/centerline & defined GO & NO-GO markings viewable thru Notional window design

4.1.2. PICATINNY CLIK ARRAY

The platform requirements when hosting an array consist of units, CU, or CPU that create a repeatable grid of expected capabilities on the UAS.

A Platform may only have one physical interface but may allow a payload of 1x2 CU if the area under the platform can accommodate it. The CU and CPU are physical and electrical boundaries that are directly related to the capabilities offered by the payload.

System Integrators are responsible for verifying that the weight and dimensions of a CLIK Unit Payload, including those designated as WxL, are within the platform's operational limits.

When mounting the rail below the UAS, allowances shall be made to accommodate wiring connected to the UAS as shown in Figure 6. No UAS protrusions may exist in this space.

Use MIL-STD-1913 as the standard for the mounting rail for payloads. The platform will specify the minimum length of the rail to be 5” via its attachment points and is dependent on the intended use of the rail whether it is longer than the minimum 5” or continuous up to the entire length of the platform. Any secondary attachment rails shall be placed on a 5” OC spacing with a clear attachment interface as seen in Figure 6. The program will specify the quantity of rails on a platform, depending on the intended use of the rails.

Payloads can be mounted onto single Picatinny rails, that are no shorter than 5-inches-long, located on the underside of the vehicle frame. If more than one Picatinny rails are required, they will run parallel to each other and are displaced (center to center) by 5.0” (127mm) If more than one Picatinny rail is required on the long axis it will be placed centered on 13.79” (350mm) and as many as needed can be placed on the underside of the UAS fuselage and can be continuous if desired. For details and space claim on Picatinny CLIK ecosystems, see Figure 3.

Note: If the UAS does not have the nominal 8” ground clearance, a takeoff platform may be used to provide clearance. Picatinny CLIK Ecosystem Space Claim – 1 Unit

The platform shall conduct analysis to determine the best mounting configurations for multiple Picatinny CLIK payloads to support proper operations and capabilities (i.e. not hinder) of the UAS.

4.1.3. IDENTIFICATION MARKINGS

The Platform shall display a permanent identification plate with human readable text and Machine-Readable Information (MRI) in accordance with MIL-STD-130N. The identification plate shall include the following minimum information: manufacturer, part number, unique serial number, maximum allowed payload weight in pounds to one decimal as APW: XX.X, and maximum available payload CLIK power units as MAC: XX (see 4.2.1.1).

4.2. POWER AND SIGNAL INTERFACE

Several requirements are put on both platforms and payloads to implement a Picatinny CLIK compliant system. To maximize flexibility for developers, the requirements are defined as functionalities where possible rather than physical implementations. The primary functional building blocks of a Picatinny CLIK platform implementation include a single Picatinny CLIK Platform Interface (PI) and one or more Picatinny CLIK Payload Channels (PC). Each Payload Channel provides the functionality required to support a corresponding payload. The functional architecture of a Picatinny CLIK system is shown in Figure 20.

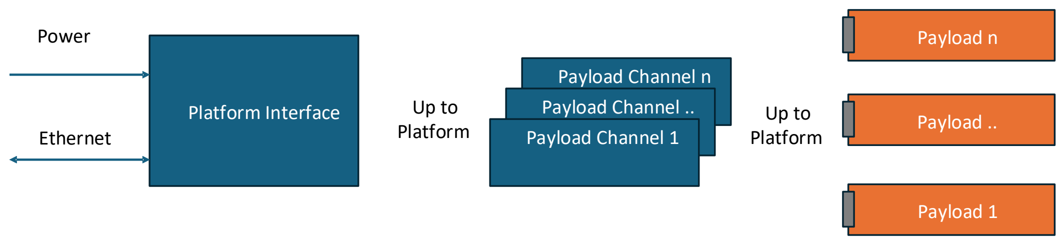


Figure 20 – Picatinny CLIK Functional Architecture

The backbone of Picatinny CLIK communication interfaces relies on an Internet Protocol bus via Ethernet. While the flexible architecture of Picatinny CLIK permits the Picatinny CLIK functions to be implemented in various ways, those functions will exist at distinct IP address and port pairs. The individual channels are identified in Table 9 along with references to the sections describing the specific requirements for each. Note that each channel would include its own IP interfaces for each function. In addition, a payload's IP interface configuration is limited to assigning a non-conflicting IP address(es). The ports used by the payload and the number of unique IP devices are left to the payload developer.

IP/Port Pair	Description	Reference
PI UDP	Optional UDP interface to Platform Controller	4.2.1.2
Payload Channel [1..n] UDP	UDP interface to Payload Channel	4.2.2.3
Payload Channel [1..n] Serial	UDP to Serial converter for Payload Channel	4.2.2.4
Payload [1..n]	Optional IP interface(s) for connected Payload	3.2.5

Table 9: Picatinny CLIK IP/Port Pairs

To better illustrate the hardware agnostic approach to the Picatinny CLIK network architecture two example implementations will be provided for a notional Picatinny CLIK platform supporting three payload channels. In this example each payload includes support for a single network device. In the example diagrams the following notation is used to represent the IP/Port pairs: Platform Interface (PI), Safety Interface (SI), Payload Channel N UDP Interface (CNI), Payload Channel N Serial Interface (CNS), Payload N Interface (PN). The respective IP address and subnet masks are represented using Classless Inter-Domain Routing (CIDR) notation, and the selected ephemeral port selected follows with a P prefix.

The notional implementation in Figure 21 uses an expanded architecture where several different devices (represented as a blue box) implement their respective interfaces. These devices could be a microcontroller or similar device. In this example the platform uses separate devices for the PI and SI. In addition, each channel uses a separate device supporting the payload channel UDP and serial interfaces. Each payload device incorporates a single network interface. In this architecture each device requires a unique IP address. Since a unique interface is the combination of both IP address and port, port numbers can be reused across different devices.

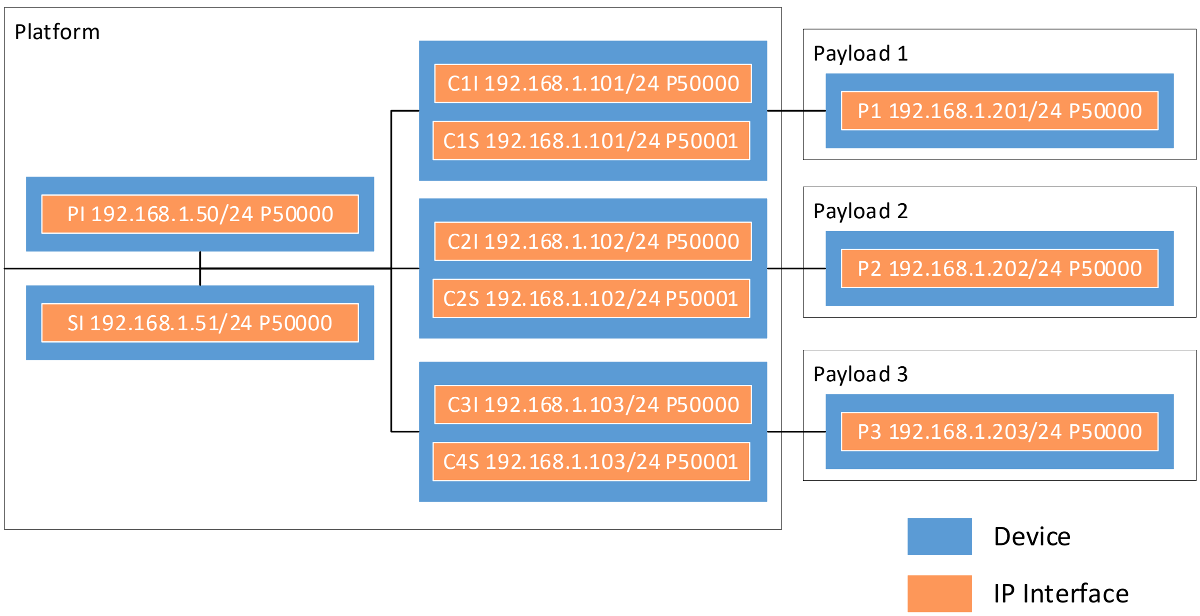


Figure 21 –Notional Network Devices (Expanded)

The notional implementation in Figure 22 uses a consolidated architecture where a single device in the platform implements all the interfaces necessary to support three payload channels. This approach is also valid. However, since the device implements a single IP address, each interface needs to be assigned a unique port.

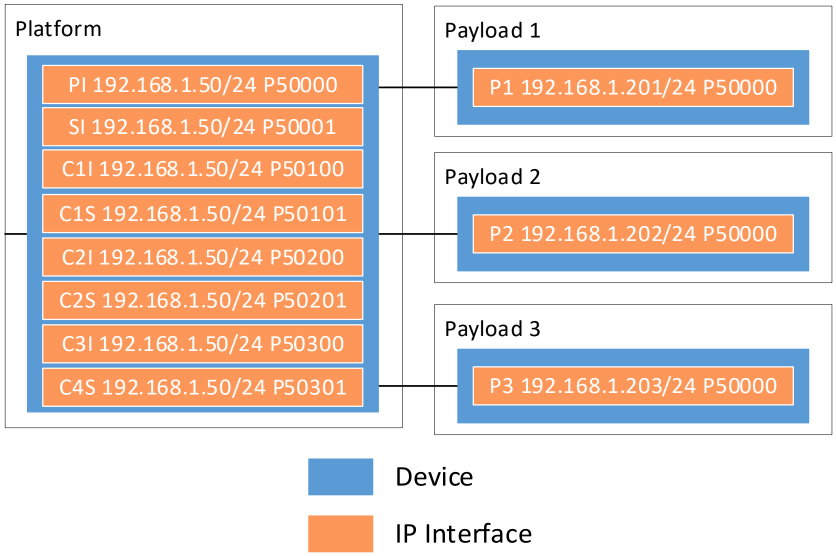


Figure 22 –Notional Network Devices (Condensed)

4.2.1. PLATFORM INTERFACE

The Platform Interface serves as the primary interface between the platform systems and the Picatinny CLIK functions. Raw power and an Ethernet interface are pulled from the platform. Regulated CLIK power, network interfaces, and safety signals are then provided to one or more Payload Channels as shown below in Figure 23.

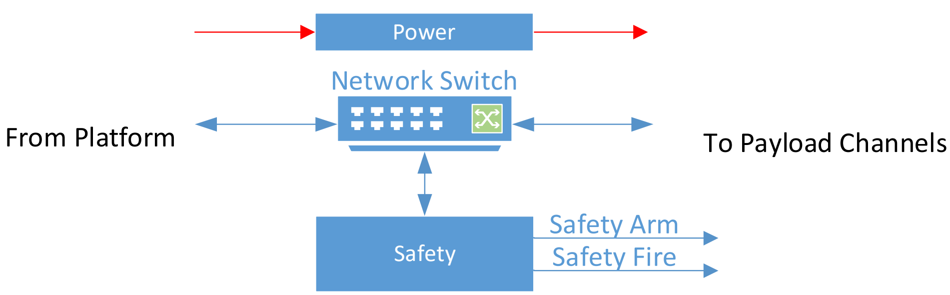


Figure 23 –Platform Interface Functions

4.2.1.1. POWER

The Platform Interface shall consume electrical power from the platform and convert it as needed to deliver the 28V power required by the Picatinny CLIK payloads. The developer shall determine the maximum current to be made available for use by payloads. The maximum available payload current (MAC) shall be converted to Picatinny CLIK Power Units (see 3.2.4) with fractional CPUs always rounding down. Overcurrent protection shall be implemented such that a failure of the Picatinny CLIK system cannot affect performance of the platform. The PI shall prevent back feeding of Picatinny CLIK power back to the platform. The PI shall implement switching of the 28V power bus between the on and off state via the Set Platform Power message as described in 5.3.5. The PI shall default to Picatinny CLIK power off when the system initially powers on. Setting the CLIK power off only removes power provided to the payloads. The functionality provided by the Platform and Channel Interfaces shall persist regardless of CLIK power state.

4.2.1.2. ETHERNET

The Platform Interface shall connect to the platform's Ethernet network and implement an individual Ethernet interface for each supported payload channel and an Ethernet interface for the safety discretes function. All interfaces shall be connected via full Layer 2 switch functionality. The PI shall support configuration of the IP addresses, subnet masks, and UDP ports for all platform network interfaces though how this is implemented is left to the platform developer. The IP addressing scheme is left to the system integrator.

The Platform Interface shall implement the UDP Protocol defined in 5.3. This interface provides the ability to request status/configuration data and issue commands. With the IP address and port of this interface a software application can identify the platform, determine the number of channels available, and collect the IP address and port pairs for each platform hosted interface.

4.2.1.3. SAFETY DISCRETES

Due to the safety critical nature of functions like arming and firing, additional efforts are required to ensure that signals used for those functions are relayed accurately and timely. The diligence required to prove out these functions for the purpose of obtaining an approved safety release in accordance with MIL-STD-882E has driven the Picatinny CLIK architecture to break out this functionality to more easily support the integration of proven solutions. The resulting architecture utilizes a dedicated network interface controlling the output of two safety signals: Arm and Fire.

The Platform Interface shall implement the safety control signals necessary for arming and firing of payload armaments. Safety signal output states shall be communicated via a network interface, presumably originating from a ground station controller. The details of this interface are to be defined in a future version of this document. Logic voltage output shall be 5V nominal with greater than or equal to 4.9V output for arm/fire and less than or equal to .1V for not armed/don't fire. Each safety signal shall be capable of supplying current of no less than the number of payload channels multiplied by 10mA while maintaining the required voltage output. The PI shall provide an independent signal return path for the safety discrete signals. The safety signals shall be shared by all Payload Channels and ultimately the Payloads themselves. Once generated by the safety interface, the Safey Arm, Safety Fire, and Safety Return signals shall be electrically isolated from all other signals using isolation devices in accordance with International Electrotechnical Commission (IEC) 60747-5-5 or IEC 60747-17. This isolation requirement shall be enforced at the system level to include the platform and any connected payloads.

4.2.2. PAYLOAD CHANNELS

The Payload Channels implement the signals used by a Picatinny CLIK payload as defined in 3.2.3. For every Picatinny CLIK payload supported, an associated Payload Channel shall be implemented. Power, network interfaces, and safety signals are taken from the Platform Interface while the Payload Channel provides power, a network interface, serial interface, safety signals and a loopback signal to the channel's associated payload. This is depicted in Figure 24.

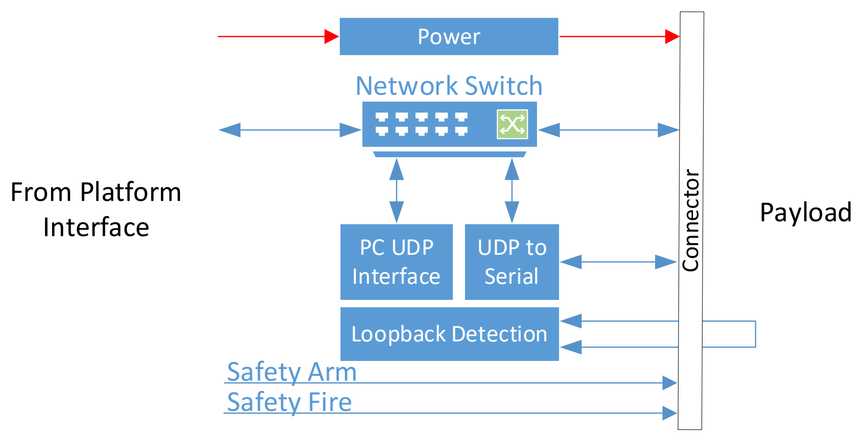


Figure 24 –Payload Channel Functions

4.2.2.1. PLATFORM CONNECTORS

Platforms shall integrate connectors to interface signals from the Platform Channels to the Payloads. Platforms shall use current available options shown in Table 10 or connectors with identical form, fit, and function as detailed below.

Series	Class	Shell Style	Material/Finish	Arrangement	Contacts	Keying
801	-009	-01	NF	9-19	S	A
2M801		-02				
	-010		ZNU			
MD801		-07				

Table 10: Approved Options for Platform Connectors

Picatinny CLIK Platform Connectors shall conform to the series, class, style, material/finish, arrangement, and keying defined in 3.2.1.

Picatinny CLIK Platform Connectors shall use Female (Socket) Contacts of Size #23.

4.2.2.2. POWER

Payload Channels shall consume electrical power from the Platform Interface and provide that power to their Picatinny CLIK payloads. Payload Channels shall implement overcurrent protection to ensure that a Picatinny CLIK payload cannot exceed the lesser of the MAC as defined in 4.2.2.2 or the MCC as defined in 3.2.4.

Payload Channels shall implement and report the power options represented in the Get Payload Channel Power Config message as described in 5.4.2. Payload Channels shall optionally implement switching of the 28V payload power between the “On” and “Off” state via the Set Payload Channel Power message as described in 5.4.3. Payload channels supporting power switching shall default to power off when the system initially powers on. Payload Channels shall optionally implement overcurrent resetting via the Set Payload Channel Power message as described in 5.4.3 with an “On” command resetting the overcurrent device and restoring power. Payload Channels shall optionally implement configurable current limit setting via the Set Payload Channel Current Limit message as described in 5.4.4.

4.2.2.3. ETHERNET

Payload Channels shall connect to the Ethernet interface instance provided by the Platform Interface. All interfaces shall be connected via full Layer 2 switch functionality. Payload Channels shall implement the Ethernet interface defined in 5.4 for channel state information and configuration. Assignment of a Payload Channel’s IP address and ports are left to the system integrator.

4.2.2.4. SERIAL

Payload Channels shall implement a UDP to bi-directional serial converter using their provided network interface. Payload Channels shall listen for network datagrams on their configured port and once received immediately transmit the raw data to the payload’s RS232 serial interface. All serial data received from the payload’s RS232 serial interface shall be discarded until communication has been initiated via receipt of a network datagram. Once a datagram has been received, data received from the payload’s RS232 Rx pin shall be packetized and returned to the IP address and source port of the most recent datagram on the indicated network port for serial transfer.

The RS232 serial interface implemented for each payload channel shall support no less than 115,200 bps data rate. Each RS232 interface channel shall implement independent functional isolation from other electrical signals. RS232 signals shall be referenced to the channel’s isolated RS232 Return signal. This isolation prevents ground loops caused by the RS232 channel's Return line serving as an additional return path for the CLIK Power Bus provided to the payload. Functional isolation shall be no less than +/-50Vrms continuous and +/-100Vrms transient for 60 seconds.

4.2.2.5. SAFETY DISCRETES

Payload Channels shall accept the safety signals provided by the PI and pass them on to their respective payloads. Safety signals shall be measured by the payload channels for state reporting to indicate the state of the safety signals being fed to each payload. The measurement of these signals shall follow the requirements specified in 3.2.8. Measurement of these signals shall occur as close to the payload as is technically feasible. For example, where signals are split the measurement should occur after the split, closer to the payload.

4.2.2.6. LOOPBACK

Payload Channels shall implement a loopback circuit for the detection of a connected payload. Output voltage from the signal shall be less than or equal to the power voltage and when shorted to common shall consume less than 1mA of current. An example of a suitable circuit would be a 10kOhm resistor pulled up to 5V connected to a digital input which gets pulled low when a payload and its loopback jumper are connected.

4.2.3. GROUNDING

The Picatinny CLIK platform grounding scheme shall be carefully designed to eliminate ground loops. The CLIK platform shall maintain isolation between its Chassis signal and all other electrical signals. The platform host power ground should have a single connection path to any CLIK ground references. The decision to bond or isolate the platform chassis to or from other ground references outside the CLIK subsystem is left to the discretion of the platform developer.

4.3. PLATFORM TO PAYLOAD CABLING

Insulated Cables shall be utilized by Platforms to connect to Payloads and distribute Power and Signals between the Platform Channels and the Payloads as shown in Figure 25. Platform and Payload Receptacle Connectors (specified in Sections 3.2.1 & 4.2.2.1) are denoted with 'J' designation. Cable Plug Connectors are denoted with 'P' designation.

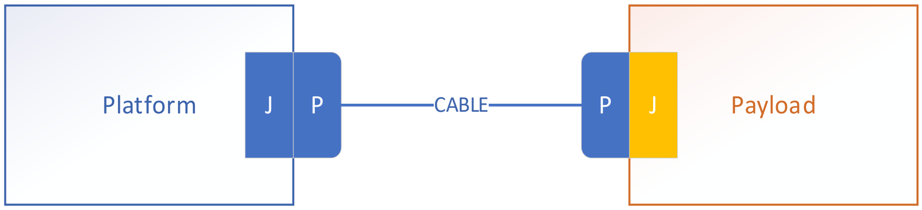


Figure 25: Platform to Payload Cables

4.3.1. CABLE CONNECTORS

Cables shall integrate connectors using available options shown in Table 11 or connectors with identical form, fit, and function as detailed below.

<table>
<tr><th>Series</th><th>Class</th><th>Shell Style</th><th>Material/Finish</th><th>Arrangement</th><th>Contacts</th><th>Keying</th></tr>
<tr><td>801</td><td rowspan="2">-007</td><td rowspan="2">-16</td><td rowspan="2">NF</td><td rowspan="4">9-19</td><td rowspan="4">*See Below</td><td rowspan="4">A</td></tr>
<tr><td rowspan="2">2M801</td></tr>
<tr><td rowspan="2">-008</td><td rowspan="2">-26</td><td rowspan="2">ZNU</td></tr>
<tr><td>MD801</td></tr>
</table>

Table 11 Approved Options for Cable Connectors

Picatinny CLIK Cable Connectors shall conform to the series, material/finish, arrangement, and keying defined in 3.2.1.

Picatinny CLIK Cable Connectors shall be of Plug Class Series options shown in Table 12. The banding platform option incorporates features to support the attachment of shielding and/or shrink boots while the rear accessory thread option requires a separate backshell (i.e. straight, 45 degree, 90 degree). Examples of both are shown in Figure 26.

Banding Platform   Rear Accessory Thread

Figure 26: Plug Connector Series Options

Series	Description
-007	Plug with Banding Platform
-008	Plug with Rear Accessory Thread

Table 12: Approved Connector Series

The approved manufacturers provide options for Shell Style. Cables can use the Shell Style Options in Table 13 that best suits their application.

Shell Style	Description
-16	Anti-Decoupling Spring
-26	Self-Locking Ratchet Mechanism

Table 13: Shell Style Options

The Picatinny CLIK Cable Connector that mates with the Payload shall use Option ‘S’ for Female (Socket) Contacts of Size #23.

The Picatinny CLIK Cable Connector that mates with the Platform shall use Option ‘P’ for Male (Pin) Contacts of Size #23.

4.3.2. POWER

Conductor Wiring for Power Signals shall be of Size 22 American Wire Gauge (AWG).

4.3.3. ETHERNET

Acceptable Sizing for Ethernet Signal Conductor Wiring shall be 22 to 28AWG in Twisted Pairs for Rx & Tx Signals.

4.3.4. SERIAL

Acceptable Sizing for Serial Signal Conductor Wiring shall be 22 to 28AWG.

4.3.5. SAFETY DISCRETES

Acceptable Sizing for Safety Discrete Signal Conductor Wiring shall be 22 to 28AWG.

4.3.6. LOOPBACK

Acceptable Sizing for Loopback Signal Conductor Wiring shall be 22 to 28AWG.

5. COMMUNICATION PROTOCOL REQUIREMENTS

5.1. COMMON MESSAGE PROTOCOL FORMAT

A common protocol shall be used for all Picatinny CLIK defined messages. Table 14 defines the contents of a Picatinny CLIK message.

Byte	Data Type	Description
1	Header 1	Fixed header value of 0xAA hexadecimal.
2	Header 2	Fixed header value of 0x55 hexadecimal.
3	Message Identifier MSB	Unique value that identifies message
4	Message Identifier LSB	
5	Sync Code	Client provided value that is repeated back in response.
6	# Data Bytes	Total number of data bytes (n)
7	Data 1	First data byte
..	..	..
N - 1	Data n	Last data byte
N	Checksum	Sum of bytes 1 through N – 1 modulo 0x100.

Table 14: Message Structure

The first two header bytes shall indicate the start of a new message with a 0xAA byte followed by a 0x55 byte (hexadecimal). The third and fourth bytes shall form a unique 16-bit message identifier indicating the contents of the message data with the most significant byte followed by the least significant byte. The fifth byte shall be reserved for a synchronization byte which the receiver shall duplicate in its response message. The sixth byte shall indicate the total number of data bytes included in the message. If one or more data bytes are indicated, then that data will start with byte seven. The final byte shall contain a checksum of all preceding bytes represented as the least significant byte of their sum. Upon detection of a valid header the receiver shall allow 500ms for the complete message to be received. If the time limit is exceeded the incoming buffer shall be discarded and the receiver shall return to waiting for a valid header.

Message Identifiers in the range of 0x0000 to 0x7FFF shall be reserved for the Picatinny CLIK interface, with all remaining identifiers from 0x8000 to 0xFFFF available for application specific use. Message Identifiers are unique to a specific protocol and reuse of Message Identifiers is permitted on different channels.

The Common Picatinny CLIK Protocol adheres to a client/server model with each role fixed. Messages from a client shall always be responded to by the server. Accepted messages shall respond using the same Message Identifier. The response can include data specific to the received message or a more general acknowledge response that acknowledges the message or provides a meaningful error code indicating why the message was rejected. Messages that request data without any additional parameters shall not require any data as part of its message.

Response messages shall always reserve at least their first data byte to indicate acceptance of the message. A rejected message shall include only the one data byte with an error code describing why the message was rejected. As with the message identifiers, response codes in the range of 0x00 to 0x7F shall be reserved for the Picatinny CLIK interface, with all remaining codes available for application specific use. Table 15 lists the codes currently supported by the Picatinny CLIK interface.

Code	Description
0x00	Command was processed successfully.
0x01	Bad checksum
0x02	Invalid Command
0x03	Invalid Data Length
0x04	Invalid Command Parameter

Table 15: Response Error Codes

5.2. PAYLOAD SERIAL PROTOCOL

The Payload Serial Protocol defines the interface implemented by the payload on its RS232 serial port. For this protocol the Payload is defined as the Server and shall only be transmitted in response to a received message. The following sections define the Picatinny CLIK defined message set that the Payload shall accept and the possible responses. This message set can be expanded as permitted in 5.1. Table 16 identifies the payload messages defined by CLIK to include their specific message identifiers and whether or not their implementation is required.

Msg Id	Description	Data Description	Required
0x0000	Get Payload Status	5.2.1	X
0x0001	Get Payload Identifier	5.2.2	X
0x0002	Get Payload System Config	5.2.3	X
0x0003	Get Payload Network Config	5.2.4	
0x0004	Set Function state	5.2.5	X
0x0005	Set Payload Network Config	5.2.6	
0x0006	Set Payload Network state	5.2.7	

Table 16: Payload Serial Message Identifiers

5.2.1. GET PAYLOAD STATUS

A payload shall respond to a Get Payload Status message with the data shown in Table 17. The number of available network interfaces can be used to enumerate their respective address information using the Get Payload Network Config message. Each function shall be allocated a data byte to represent its state. For example, a payload with 9 functions would require 9 additional bytes after the Number of Functions byte. Function states shall be assigned starting with Function 1 assigned to data byte 6 and increasing upwards.

Data	Data Type	Description
1	Error Code	See Table 15
2	Status Bit Fields	Bitwise state data. See Table 18
3	Available Net Interfaces	Total number of network interfaces
4	Enabled Net Interface	Number of network interfaces enabled
5	Number of Functions	Number of functions implemented by the payload
..	Function states	0 or more bytes indicating function states. 0=Unavailable, 1=Not Activated, 2=Activated, 3=Armed, 4=Firing

Table 17: Payload Status Response Data Structure

Bit #	Name	Description	
0	Health	1=Functional	0=Not functional
1	Safety Arm state	1=Activated	0=Not activated
2	Safety Fire state	1=Activated	0=Not activated
3	Functions Available	1=1 or More	0=None
4	Functions Activated	1=1 or More	0=None
5	Functions Armed	1=1 or More	0=None
6	Reserved		
7	Reserved		

Table 18: Payload Status Bit Fields

5.2.2. GET PAYLOAD IDENTIFIER

A payload shall respond to a Get Payload Identifier message with the data shown in Table 19. The descriptive identifier shall be used by the payload to identify itself and shall be represented using no more than 32 characters represented using printable seven-bit American Standard Code for Information Interchange (ASCII) codes terminated by a null (zero) byte. The unique identifier field shall optionally be used by the payload to uniquely identify individual payload units (i.e. serial number) as an unsigned integer. The version field shall optionally be used by the payload to indicate a particular version or configuration of the payload. The version shall be represented using no more than 16 characters represented using printable seven-bit ASCII codes terminated by a null (zero) byte. A value of 0 shall be used for the unique identifier (UID) and Version fields if they are not used.

Data	Data Type	Description
1	Error Code	See Table 15
2	UID MSB	Unique identifier most significant byte.
3	UID LSB	Unique identifier least significant byte.
..	Identifier	ASCII text identifying payload
..	Version	Configuration version of the payload

Table 19: Payload Identifier Response Data Structure

5.2.3. GET PAYLOAD SYSTEM CONFIG

A payload shall respond to a Get Payload System Config message with the data shown in Table 20.

Data	Data Type	Description
1	Error Code	See Table 15
2	MPC	Maximum Payload Picatinny CLIK Power Units per 3.2.4.
3	MPW MSB	Unsigned 16-bit integer representing maximum payload weight in tenths of pounds.
4	MPW LSB	
5	Safety Discretes Monitored	1=Yes 0=No

Table 20: Payload System Config Response Data Structure

5.2.4. GET PAYLOAD NETWORK CONFIG

A payload shall accept a Get Payload Network Config message formatted with the data shown in Table 21.

Data	Data Type	Description
1	Selected Interface	Network interface to return. 1-255

Table 21: Get Payload Network Config

A payload shall respond to a Get Payload Network Config message with the data shown in Table 22. If the interface does not provide an IP interface it shall respond with a value of 0.0.0.0/0.

Data	Data Type	Description
1	Error Code	See Table 15
2	Requested Interface	Interface requested
3	Interface state	1=Enabled 0=Disabled
4	IP Address Octet 1	NNN.NNN.NNN.NNN
5	IP Address Octet 2	NNN.NNN.NNN.NNN
6	IP Address Octet 3	NNN.NNN.NNN.NNN
7	IP Address Octet 4	NNN.NNN.NNN.NNN
8	Subnet Bits	Integer value indicating number of subnet bits (CIDR Notation)

Table 22: Payload Get Network Config Response Data Structure

5.2.5. SET FUNCTION STATE

A payload shall accept a Set Function state message with the data shown in Table 23. If the message is valid the Payload shall set the indicated function channel to the commanded state and respond with a single data byte set to 0x00 for success. If rejected, a byte containing the error code shall be returned.

Data	Data Type	Description
1	Function Channel	Function channel to set. 0 for all functions.
2	Function state	1=Activate 0=De-Activate

Table 23: Set Payload Function State Receive Data Structure

5.2.6. SET PAYLOAD NETWORK CONFIG

A payload shall optionally accept a Set Payload Network Config message with the data shown in Table 24. If the message is valid the Payload shall change its IP address and subnet to the commanded values and respond with a single data byte set to 0x00 for success. If rejected, a byte containing the error code shall be returned.

Data	Data Type	Description
1	Selected Interface	Interface to configure
2	Network Interface state	1=Enabled 0=Disabled
3	IP Address Octet 1	NNN.NNN.NNN.NNN
4	IP Address Octet 2	NNN.NNN.NNN.NNN
5	IP Address Octet 3	NNN.NNN.NNN.NNN
6	IP Address Octet 4	NNN.NNN.NNN.NNN
7	Subnet Bits	Integer value indicating number of subnet bits (CIDR Notation)

Table 24: Set Payload Network Config Receive Data Structure

5.2.7. SET PAYLOAD NETWORK STATE

A payload shall optionally accept a Set Payload Network state message with the data shown in Table 25. If the message is valid the Payload shall change the commanded network interface to the commanded state and respond with a single data byte set to 0x00 for success. If rejected, a byte containing the error code shall be returned.

Data	Data Type	Description
1	Selected Interface	Interface to set. 0 to set all.
2	Network Interface state	1=Enabled 0=Disabled

Table 25: Set Payload Network State Receive Data Structure

5.3. PI UDP PROTOCOL

The PI UDP Protocol defines the interface implemented by the Picatinny CLIK PI. For this protocol the PI is defined as the Server and shall only be transmitted in response to a received message. The following sections define the Picatinny CLIK defined message set that the PI shall accept and the possible responses. This message set can be expanded as permitted in 5.1. Table 26 identifies the payload messages defined by CLIK to include their specific message identifiers and whether or not their implementation is required.

Msg Id	Description	Data Description	Required
0x0000	Get PI Status	0	X
0x0001	Get Platform Identifier	5.3.2	X
0x0002	Get Platform System Config	5.3.3	X
0x0003	Get Platform Network Config	5.3.4	X
0x0004	Set Platform Power	5.3.5	X

Table 26: PI UDP Protocol

5.3.1. GET PI STATUS

A PI shall respond to a Get PI Status message with the data shown in Table 27. An unsupported value shall be represented by the upper limits of the field (i.e. 255, 65535).

Data	Data Type	Description
1	Error Code	See Table 15
2	Payloads Supported	Number of Payload Channels supported by the platform
3	Payloads Connected	Number of Payloads currently connected
4	Status Bit Fields	Bitwise state data. See Table 28.
5	Platform Voltage In MSB	Unsigned 16-bit integer representing raw platform input voltage in millivolts.
6	Platform Voltage In LSB	
7	Platform Current Draw MSB	Unsigned 16-bit integer representing platform current draw in milliamps.
8	Platform Current Draw LSB	
9	Picatinny CLIK Power Voltage Out MSB	Unsigned 16-bit integer representing Picatinny CLIK Power Bus voltage in millivolts.
10	Picatinny CLIK Power Voltage Out LSB	
11	Picatinny CLIK Power Current Draw MSB	Unsigned 16-bit integer representing Picatinny CLIK Power Bus current consumption in milliamps.
12	Picatinny CLIK Power Current Draw LSB	

Table 27: PI Status Response Data Structure

Bit #	Name	Description	
0	Overcurrent Tripped	1=Yes	0=No
1	Picatinny CLIK Power Bus state	1=On	0=Off
2	Safety Arm state	1=Activated	0=Not activated
3	Safety Fire state	1=Activated	0=Not activated
4	Reserved		
5	Reserved		
6	Reserved		
7	Reserved		

Table 28: Platform Status Bit Fields

5.3.2. GET PLATFORM IDENTIFIER

A platform shall respond to a Get Platform Identifier message with the data shown in Table 29. The descriptive identifier shall be used by the platform to identify itself and shall be represented using no more than 32 characters represented using printable seven-bit ASCII codes terminated by a null (zero) byte. The unique identifier field shall optionally be used by the platform to uniquely identify individual platforms as an unsigned integer. The version field shall optionally be used by the platform to indicate a particular version or configuration of the platform. The version shall be represented using no more than 16 characters represented using printable seven-bit ASCII codes terminated by a null (zero) byte. A value of 0 shall be used for the UID and Version fields if they are not used.

Data	Data Type	Description
1	Error Code	See Table 15
2	UID MSB	Unique identifier most significant byte.
3	UID LSB	Unique identifier least significant byte.
..	Identifier	ASCII text identifying platform
..	Version	Configuration version of the platform

Table 29: Get Platform Identifier

5.3.3. GET PLATFORM SYSTEM CONFIG

A PI shall respond to a Get Platform System Config message with the data shown in Table 30.

Data	Data Type	Description
1	Error Code	See Table 15
2	MAC	Maximum Available Picatinny CLIK Power Units per 4.2.1.1.
3	APW MSB	Unsigned 16-bit integer representing total allowed payload weight in tenths of pounds.
4	APW LSB	

Table 30: Platform System Config Response Data Structure

5.3.4. GET PLATFORM NETWORK CONFIG

The PI shall accept a Get Platform Network Config message formatted with the data shown in Table 31.

Data	Data Type	Description
1	Selected Interface	0: PI UDP Channel 255: Safety Discrete Channel N: Payload Channel N UDP Channel N+127: Payload Channel N Serial Converter Channel

Table 31: Get Platform Network Config

The PI shall respond to a Get Platform Network Config message with the data shown in Table 32 for the indicated interface. If the interface does not provide an IP interface it shall respond with a value of 0.0.0.0/0.

Data	Data Type	Description
1	Error Code	See Table 15
2	Requested Interface	See Table 31
3	IP Address Octet 1	NNN.NNN.NNN.NNN
4	IP Address Octet 2	NNN.NNN.NNN.NNN
5	IP Address Octet 3	NNN.NNN.NNN.NNN
6	IP Address Octet 4	NNN.NNN.NNN.NNN
7	Subnet Bits	Integer value indicating number of subnet bits (CIDR Notation)
8	UDP Port MSB	UDP port associated with indicated interface
9	UDP Post LSB	

Table 32: Payload Get Network Config Response Data Structure

5.3.5. SET PLATFORM POWER

The PI shall accept a Set Platform Power message with the data shown in Table 33. If message is valid the PI shall set the Picatinny CLIK power bus to the commanded state. If rejected, a byte containing the error code shall be returned. If an overcurrent event has occurred a command to turn the bus state on shall reset the overcurrent device.

Data	Data Type	Description
1	Picatinny CLIK Power Bus state	1=On 0=Off

Table 33: Set Platform Power Receive Data Structure

5.4. PAYLOAD CHANNEL UDP PROTOCOL

The Payload Channel Interface UDP Protocol defines the interface implemented by each Picatinny CLIK Payload Channel. For this protocol the Payload Channel is defined as the Server and shall only be transmitted in response to a received message. The following sections define the Picatinny CLIK defined message set that the Payload Channels shall accept and the possible responses. This message set can be expanded as permitted in 5.1. Table 34 identifies the payload messages defined by CLIK to include their specific message identifiers and whether or not their implementation is required.

Msg Id	Description	Data Description	Required
0x0000	Get Payload Channel Status	5.4.1	X
0x0001	Get Payload Channel Power Config	5.4.2	X
0x0002	Set Payload Channel Power	5.4.3	
0x0003	Set Payload Channel Current Limit	5.4.4	

Table 34: PI UDP Message Identifiers

5.4.1. GET PAYLOAD CHANNEL STATUS

A PI shall respond to a Get PI Status message with the data shown in Table 35. An unsupported value shall be represented by the upper limits of the field (i.e. 255, 32767, 65535).

Data	Data Type	Description
1	Error Code	See Table 15
2	Payload Connected	1=Yes 0=No
3	Voltage Out MSB	Unsigned 16-bit integer representing voltage provided to the payload in millivolts.
4	Voltage Out LSB	
5	Current Draw MSB	Signed 16-bit two's compliment integer representing platform current draw in milliamps. (negative = payload sourcing power)
6	Current Draw LSB	
7	Status Bit Fields	Bitwise state data. See Table 36: Payload Channel Status Bit Fields

Table 35: Payload Channel Response Status Data Structure

Bit #	Name	Description	
0	Overcurrent Tripped	1=Yes	0=No
1	Channel Power state	1=On	0=Off
2	Safety Arm state	1=Activated	0=Not activated
3	Safety Fire state	1=Activated	0=Not activated
4	Reserved		
5	Reserved		
6	Reserved		
7	Reserved		

Table 36: Payload Channel Status Bit Fields

5.4.2. GET PAYLOAD CHANNEL POWER CONFIG

A PI shall respond to a Get Platform Power Config message with the data shown in Table 37.

Data	Data Type	Description
1	Error Code	See Table 15
2	Current Limit	Number of Picatinny CLIK Power Units allowed or 0 for no limiting
3	Power Options	See Table 38: Payload Channel Power Option Bit Fields.

Table 37: Payload Channel Power Config Response Data Structure

Bit #	Name	Description	
0	Overcurrent Circuit Reset	1=Yes	0=No
1	Configurable Current Limit	1=Yes	0=No
2	Power On/Off Control	1=Yes	0=No
3	Reserved		
4	Reserved		
5	Reserved		
6	Reserved		
7	Reserved		

Table 38: Payload Channel Power Option Bit Fields

5.4.3. SET PAYLOAD CHANNEL POWER

The Payload Channel shall optionally accept a Set Payload Channel Power message with the data shown in Table 39: Set Platform Power Receive Data Structure. If the message is valid the Payload Channel shall set the payload power bus to the commanded state. If the Overcurrent Circuit Reset option is supported an overcurrent state shall be reset by setting the bus state to on. If the command is rejected a byte containing the error code shall be returned.

Data	Data Type	Description	
1	Payload Channel Bus state	1=On	0=Off

Table 39: Set Platform Power Receive Data Structure

5.4.4. SET PAYLOAD CHANNEL CURRENT LIMIT

The Payload Channel shall optionally accept a Set Payload Channel Current Limit message with the data shown in Table 40. If message is valid the Payload Channel shall set the payload power bus to the commanded current limit. The upper limit shall be lesser of the platform current limit or connector current limit. If the command is rejected a byte containing the error code shall be returned.

Data	Data Type	Description
1	Payload Current Limit	Payload current limit in 10ths of Amps.

Table 40: Set Payload Channel Current Limit Receive Data Structure

APPENDIX A ACRONYMS AND ABBREVIATIONS

A	Amperes
AC	Armament Center
ACK	Acknowledgement
AiTR	Artificial Intelligence Target Recognition
ASCII	American Standard Code for Information Interchange
AWG	American Wire Gauge
BI_DA	Bi-directional Pair A
BI_DB	Bi-directional Pair B
C	Celsius
CAN	Canbus
CANH	Controller Area Network High
CANL	Controller Area Network Low
CG	Center of Gravity
CIDR	Classless Inter-Domain Routing
CLIK	Common Lethality Integration Kit
cm	Centimeter
CNI	Channel N UDP Interface
CNS	Channel N Serial Interface
CTI	Controlled Technical Information
CUI	Controlled Unclassified Information
CPU	CLIK Power Units
CU	CLIK Unit
DC	Direct Current
DEVCOM	Combat Capabilities Development Command
DEVCOM-AC	Combat Capabilities Development Command Armament Center
EW	Electronic Warfare
FC	Fire Control
FCS	Fire Control Station
GCS	Ground Control Station
GND	Ground
GPS	Global Positioning System
I/O	Input/Output (I/O)
I2C	Inter-Integrated Circuit Protocol
I^2C	Inter-Integrated Circuit Protocol
IAW	In Accordance With
ICD	Interface Control Document
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IO	Input Output
IP	Internet Protocol
ISR	Intelligence, Surveillance & Reconnaissance
JOTP	Joint Ordnance Test Procedure
LSB	Least Significant Byte
m	Meter

mA	milliamps
MAC	Maximum Aircraft CPU
MCC	Maximum Connector CPU
MIL	Military
MIL-DTL	Military Detail
MIL-STD	Military Standard
MIN	Minimum
mm	millimeter
MPC	Maximum Payload CPU
MRI	Machine-Readable Information
MSB	Most Significant Byte
ms	milliseconds
OC	On Center
PBAS	Purpose Built Attritable System
PC	Payload Channels
PCB	Printed Circuit Board
PI	Platform Interface
PKG	Package
PM	Project Manager
PM CCS	Project Manager Close Combat Systems
PM UAS	Project Manager Unmanned Aerial Systems
PN	Payload N Interface
QD	Quick Disconnect
REV	Revision
RF	Radio Frequency
s	seconds
SCL	Short Circuit Level
SDA	Serial Data Line
SI	Safety Interface
SRR	Short Range Reconnaissance
STD	Standard
sUPI	small Universal Payload Interface
TBD	To Be Determined
TTL	Transistor-Transistor Logic
UAS	Unmanned Aerial System
UAV	Unmanned Aerial Vehicle
UID	Unique Identifier
UDP	User Datagram Protocol
V	Volts
Ω	Ohms