

pingStation

ICD

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| **Rev I** |

第一版



Allen

1. **Overview**概述

**pingStation is an environmentally protected, networked dual-link ADS-B receiver. It can be configured for use in both internet connected and disconnected environments, and provides an extensible platform for collecting and processing surveillance data.**

**A single Ethernet port provides data connectivity and power to the device using Power-over-Ethernet (PoE). The device contains a DHCP client, and accepts DHCP leases based on existing network policy. To determine the assigned device address please consult your network administrator.**

**Surveillance data may be consumed using the methods detailed here.**

pingStation是一款环保型网络双链路ADS-B接收器。 它可以配置为用于连接互联网和断开连接的环境，并为收集和处理监控数据提供可扩展的平台。

一个以太网端口使用以太网供电（PoE）为设备提供数据连接和电源。 该设备包含一个DHCP客户端，并根据现有网络策略接受DHCP租约。 要确定分配的设备地址，请咨询您的网络管理员。

使用这里详述的方法可能会消耗监视数据。

1. **Data Class数据类**

**Data is received by pingStation and undergoes processing. The received aircraft data is parsed and assembled, it may contain information derived from a number of packets. This information is JSON formatted, stateless and fully self-describing.**

数据由pingStation接收并进行处理。 接收到的飞机数据被解析和汇编，它可能包含从多个数据包中获得的信息。 这些信息是JSON格式，无状态和完全自我描述。

* 1. **JSON Traffic object** JSON流量对象

**The pingStation delivers fields in the traffic table that are valid where field validity can be determined. This includes coordinates, altitude, heading, velocity, callsign, squawk, vertical velocity, and barometer difference. The JSON array of fields are dynamic.**

**The JSON document consists of an array of aircraft containing the following fields:**

pingStation在交通表中提供有效的字段，以确定字段有效性。 这包括坐标，高度，航向，速度，呼号，指尖，垂直速度和气压计差异。 JSON数组字段是动态的。

JSON文件由一系列包含以下字段的飞机组成：

|  |  |  |
| --- | --- | --- |
| **字段名** | **类型** | **描述** |
| icaoAddress | %02X%02X%02X 十六进制 | ICAO of the aircraft  国际民航组织的飞机 |
| trafficSource | %d 十进制整数(int) | 0 = 1090ES  1 = UAT |
| latDD | %f 十进制浮点数(float) | Latitude expressed as decimal degrees  纬度以十进制度表示 |
| lonDD | %f 十进制浮点数(float) | Longitude expressed as decimal degrees  经度以十进制度表示 |
| altitudeMM | %ld 十进制整数(long) | Geometric altitude or barometric pressure altitude in millimeters  几何高度或以毫米为单位的气压高度 |
| headingDE2 | %d 十进制整数(int) | Course over ground in centi-degrees  以厘米为单位的地面航向 |
| horVelocityCMS | %lu long unsigned数据类型无符号长整数或无符号长浮点数 | Horizontal velocity in centimeters/sec  以厘米/秒为单位的水平速度 |
| verVelocityCMS | %ld 十进制整数(long) | Vertical velocity in centimeters/sec with positive being up  以厘米/秒为单位的垂直速度正向上升 |
| squawk | %d 十进制整数(int) | Squawk code  Squawk代码 |
| altitudeType | %d 十进制整数(int) | Altitude Source  高度类型  0 = Pressure  1 = Geometric |
| callsign | %c%c%c%c  %c%c%c%c | Callsign  呼号 |
| emitterType | %d 十进制整数(int) | Category type of the emitter  发射器的分类类型：  0 =无航空器类型信息  1 =轻型（国际民航组织）<15,500磅  2 =小型 - 15,500至75,000磅  3 =大型 - 75,000至300,000磅  4 =高涡大（例如B757）  5 =重型（ICAO） - > 300,000 lbs  6 =高度机动性> 5G加速度和高速度  7 =旋翼机  8 =（未分配）  9 =滑翔机/滑翔机  10 =比空气更轻  11 =跳伞者/潜水员  12 =超轻/滑翔机/滑翔伞13 =（未分配）  14 = 无人驾驶飞行器  15 =太空/超大气量车辆  16 =（未分配）  17 =地面车辆应急车辆  18 =地面车辆服务车辆  19 =障碍物（包括系留气球）  20 =群障碍物  21 =线障碍物  22-39 =（保留） |
| sequenceNumber | %d 十进制整数(int) | Auto incrementing packet sequence number  自动递增数据包序列号 |
| pingStationGuid | %02x%02x%02x%02x  %02x%02x%02x%02x | Unique pingStation identifier  唯一的pingStation标识符 |
| utcSync | %d 十进制整数(int) | UTC time flag  UTC时间标志 |
| timeStamp | %s 字符串 | Time packet was received at the pingStation ISO 8601 format:  YYYY-MM-DDTHH:mm:ss:ffffffffZ  时间数据包以pingStation ISO 8601格式接收：  YYYY-MM-DDTHH：MM：SS：ffffffffZ |

**A field called “detail” may be present containing the following data:**

可能会出现一个名为“详细信息”的字段，其中包含以下数据：

|  |  |  |
| --- | --- | --- |
| Field Name  字段名 | Data Type  数据类型 | Description  藐视 |
| Common Fields to 1090ES and UAT  1090ES和UAT的常见字段 | | |
| navIntegrity | %d 十进制整数(int) | Navigation integrity category (NIC)  0 = RC >=37.04 km (20 NM) Unknown Integrity  1 = RC < 37.04 km (20 NM) RNP-10 containment radius  2 = RC < 14.816 km (8 NM) RNP-4 containment radius  3 = RC < 7.408 km (4 NM) RNP-2 containment radius  4 = RC < 3.704 km (2 NM) RNP-1 containment radius  5 = RC < 1852 m (1 NM) RNP-0.5 containment radius  6 = RC < 1111.2 m (0.6 NM) RNP-0.3 containment radius  7 = RC < 370.4 m (0.2 NM) RNP-0.1 containment radius  8 = RC < 185.2 m (0.1 NM) RNP-0.05 containment radius  9 = RC < 75 m and VPL < 112 m e.g., SBAS, HPL, VPL  10 = RC < 25 m and VPL < 37.5 m e.g., SBAS, HPL, VPL  11 = RC < 7.5 m and VPL < 11 m e.g., GBAS, HPL, VPL  12 = (Reserved) (Reserved)  13 = (Reserved) (Reserved)  14 = (Reserved) (Reserved)  15 = (Reserved) (Reserved)  ==================================  导航完整性类别（NIC）  0 = RC> = 37.04公里（20海里）未知的完整性  1 = RC <37.04公里（20海里）RNP-10容纳半径  2 = RC <14.816公里（8海里）RNP-4收容半径  3 = RC <7.408公里（4海里）RNP-2容纳半径  4 = RC <3.704 km（2 NM）RNP-1容纳半径  5 = RC <1852 m（1 NM）RNP-0.5容积半径  6 = RC <1111.2米（0.6海里）RNP-0.3收容半径  7 = RC <370.4 m（0.2 NM）RNP-0.1容纳半径  8 = RC <185.2米（0.1海里）RNP-0.05容积半径  9 = RC <75m且VPL <112m，例如SBAS，HPL，VPL  10 = RC <25m且VPL <37.5m，例如SBAS，HPL，VPL  11 = RC <7.5m且VPL <11m，例如GBAS，HPL，VPL  12 =（保留）（保留）  13 =（保留）（保留）  14 =（保留）（保留）  15 =（保留）（保留） |
| navAccuracy | %d 十进制整数(int) | Navigation accuracy category (NACv)  0 = Unknown or >= 10 m/s Unknown >= 50 feet (15.24 m) per second  1 = < 10 m/s < 50 feet (15.24 m) per second  2 = < 3 m/s < 15 feet (4.57 m) per second  3 = < 1 m/s < 5 feet (1.52 m) per second  4 = < 0.3 m/s < 1.5 feet (0.46 m) per second  5 = (Reserved) (Reserved)  6 = (Reserved) (Reserved)  7 = (Reserved) (Reserved)  导航精度类别（NACv）  0 =未知或> = 10 m / s未知> =每秒50英尺（15.24米）  1 = <10米/秒<50英尺（15.24米）每秒  2 = <3米/秒<15英尺（4.57米）每秒  3 = <1米/秒<5英尺（1.52米）每秒  4 = <0.3米/秒<1.5英尺（0.46米）每秒  5 =（保留）（保留）  6 =（保留）（保留）  7 =（保留）（保留） |
| verVelocitySrc | %d 十进制整数(int) | Vertical velocity source  0 = Pressure  1 = Geometric  垂直速度源  0 =压力  1 =几何 |
| emergencyStatus | %d 十进制整数(int) | Emergency status  0 = No-Emergency  1 = General Emergency  2 = Lifeguard/Medical  3 = Min Fuel  4 = No Comm  5 = Unlawful Interference  6 = Downed Aircraft  紧急状态  0 =没有紧急情况  1 =一般紧急情况  2 =救生员/医疗  3 =最低燃油  4 =没有通信  5 =非法干扰  6 =飞机坠毁 |
| sysIntegrityLevel | %d 十进制整数(int) | System Integrity Level (SIL)  系统完整性等级（SIL） |
| airGroundState | %d 十进制整数(int) | Airborne or ground  0 = Airborne subsonic condition  1 = Airborne supersonic condition  3 = On ground condition  空中或地面  0 =机载亚音速条件  1 =机载超音速情况  3 =地面情况 |
| svHeadingType | %d 十进制整数(int) | Track angle from heading  0 = Data Not Available  1 = True Track Angle  2 = Magnetic Heading  3 = True Heading  从标题跟踪角度  0 =数据不可用  1 =真实的轨道角度  2 =磁性标题  3 =真正的标题 |
| verticalVelType | %d 十进制整数(int) | Vertical rate information  0 = Pressure  1 = Geometric  垂直速率信息  0 =压力  1 =几何 |
| navPostionAccuracy | %d 十进制整数(int) | The reported State Vector has sufficient position accuracy for the intended use (NACp)  0 = EPU >= 18.52 km (10 NM)  1 = EPU < 18.52 km (10 NM)  2 = EPU < 7.408 km (4 NM)  3 = EPU < 3.704 km (2 NM)  4 = EPU < 1852 m (1NM)  5 = EPU < 926 m (0.5 NM)  6 = EPU < 555.6 m (0.3 NM)  7 = EPU < 185.2 m (0.1 NM)  8 = EPU < 92.6 m (0.05 NM)  9 = EPU < 30 m and VEPU < 45  10 = EPU < 10 m and VEPU < 15  11 = EPU < 3 m and VEPU < 4 m  12 = (Reserved)  13 = (Reserved)  14 = (Reserved)  15 = (Reserved)  所报告的状态矢量对于预期用途具有足够的位置精度（NACp）  0 = EPU> = 18.52公里（10海里）  1 = EPU <18.52公里（10海里）  2 = EPU <7.408公里（4海里）  3 = EPU <3.704公里（2海里）  4 = EPU <1852米（1NM）  5 = EPU <926米（0.5海里）  6 = EPU <555.6m（0.3NM）  7 = EPU <185.2m（0.1NM）  8 = EPU <92.6m（0.05NM）  9 = EPU <30m且VEPU <45  10 = EPU <10m且VEPU <15  11 = EPU <3m，VEPU <4m  12 =（保留）  13 =（保留）  14 =（保留）  15 =（保留） |
| navVelocityAccuracy | %d 十进制整数(int) | The least accurate velocity component being transmitted (NACv)  （NACv）  0 = Unknown or >= 10 m/s Unknown or >= 50 feet (15.24 m) per second  1 = < 10 m/s < 50 feet (15.24 m) per second  2 = < 3 m/s < 15 feet (4.57 m) per second  3 = < 1 m/s < 5 feet (1.52 m) per second  4 = < 0.3 m/s < 1.5 feet (0.46 m) per second  5 = (Reserved) (Reserved)  6 = (Reserved) (Reserved)  7 = (Reserved) (Reserved)  正在传输的最不准确的速度分量  0 =未知或> = 10 m / s未知或> = 50英尺（15.24米）每秒  1 = <10米/秒<50英尺（15.24米）每秒  2 = <3米/秒<15英尺（4.57米）每秒  3 = <1米/秒<5英尺（1.52米）每秒  4 = <0.3米/秒<1.5英尺（0.46米）每秒  5 =（保留）（保留）  6 =（保留）（保留）  7 =（保留）（保留） |
| navIntegrityBaro | %d 十进制整数(int) | Barometer checked (NICbaro)  0 = Barometric Pressure Altitude has NOT been cross checked  1 = Barometric Pressure Altitude has been cross checked  检查气压计（NICbaro）  0 =气压高度未被交叉检查  1 =气压高度已被交叉检查 |
| tcasAcasOperating | %d 十进制整数(int) | Aircraft is fitted with a TCAS (ACAS) computer and that computer is turned on and operating in a mode that can generate Resolution Advisory (RA) alerts  飞机安装了TCAS（ACAS）计算机，并且该计算机已启动并以可产生解决方案咨询（RA）警报的模式运行 |
| tcasAcasAdvisory | %d 十进制整数(int) | TCAS II or ACAS computer is currently issuing a Resolution Advisory  TCAS II或ACAS计算机目前正在发布解决方案咨询 |
| identSwActive | %d 十进制整数(int) | Ident switch is activated  Ident开关被激活 |
| atcServicesRecvd | %d 十进制整数(int) | ATC pilot message mode setting  ATC导航消息模式设置 |
| magHeading | %d 十进制整数(int) | True north or magnetic north  0 = True north  1 = Magnetic north  真北或磁北  0 =真北  1 =磁北 |
| utcCoupledCondition | %d 十进制整数(int) | Represents if the Ground Station is UTC-Coupled  0 = Ground Station is not UTC coupled  1 = Ground Station is UTC coupled  代表地面站是UTC耦合的  0 =地面站不是UTC耦合的  1 =地面站与UTC耦合 |
| 1090ES Specific Fields  1090ES特定字段 | | |
| surveilStatus | %d 十进制整数(int) | Surveillance status  0 = No Condition  1 = permanent alert  2 = temp alert  3 = SPI  监视状态  0 =无条件  1 =永久警报  2 =临时警报  3 = SPI |
| baroaltDiffMM | %ld 十进制整数(long) | Difference between the pressure altitude and the gnss altitude in mm  压力高度与gnss高度之差（mm） |
| UAT Specific Fields  UAT特定字段 | | |
| secondaryAltType | %d 十进制整数(int) | Altitude source  0 = Pressure  1 = Geometric  高度源  0 =压力  1 =几何 |
| secondaryAltitudeMM | %ld 十进制整数(long) | Geometric altitude or barometric pressure altitude in millimeters  几何高度或以毫米为单位的气压高度 |
| tisBSiteId | %d 十进制整数(int) | The tisBSiteId is unit-less and is from the a transmitted TISb UAT message signifies which uplink tower transmitted the TISb frame  tisBSiteId无单位，并且来自发送的TISb UAT消息，表示哪个上行链路塔发送TISb帧 |
| transmitMSO | %d 十进制整数(int) | the transmitMSO is the 6bit field from the transmitted UAT message which should signify which MSO the message was transmitted in. MSO's can range from 0 to 3951 but only transmit the 6 LSB's of the actual MSO if transmitted. Received range is from 0 - 63.  发送MSO是来自所发送的UAT消息的6位字段，其应该表示该消息被发送到哪个MSO .MSO的范围可以从0到3951，但是只发送实际MSO的6个LSB。 接收的范围是从0到63。 |
| addressQualifier | %d 十进制整数(int) | Defines the type of target that delivered the data  0 = ADS-B target with ICAO 24-bit  1 = Reserved for National use  2 = TIS-B target with ICAO 24-bit address  3 = TIS-B target with track file identifier  4 = Surface Vehicle  5 = Fixed ADS-B Beacon  6 = (Reserved)  7 = (Reserved  定义传送数据的目标类型  0 =带ICAO的ADS-B目标24位  1 =保留供国家使用  2 =带ICAO 24位地址的TIS-B目标  3 =带跟踪文件标识符的TIS-B目标  4 = 地面车辆  5 =固定ADS-B信标  6 =（保留）  7 =（保留 |
| uatMopsVersion | %d 十进制整数(int) | 1 = DO-282A  2 = DO-282B |
| callSignID | %d 十进制整数(int) | 0 = Fightplan  1 = CallSign |

* 1. **JSON Status object JSON状态对象**

Periodic health and status JSON.

定期健康和状态JSON。

|  |  |  |
| --- | --- | --- |
| Field Name  字段名 | Data Type  数据类型 | Description  描述 |
| pingStationGuid | %02x%02x%02x%02x  %02x%02x%02x%02x | Unique pingStation identifier  唯一的pingStation标识符 |
| pingStationVersionMajor | %d 十进制整数(int) | PINGSTATION\_MAJOR\_VERSION  主版本 |
| pingStationVersionMinor | %d 十进制整数(int) | PINGSTATION\_MINOR\_VERSION  次版本 |
| pingStationVersionBuild | %d 十进制整数(int) | PINGSTATION\_BUILD\_VERSION  修订版 |
| timeStamp | %s 字符串 | Time packet was received at the pingStation ISO 8601 format  时间数据包以pingStation ISO 8601格式收到 |
| pingStationLatDD | %f 浮点型 | Fixed station latitude expressed as decimal degrees  固定站的纬度以十进制度表示 |
| pingStationLonDD | %f 浮点型 | 固定站经度表示为十进制度数 |
| pingStationAltType | %d 十进制整数(int) | 0 = Barometric Altitude  1 = GNSS Altitude  0 =气压高度  1 = GNSS海拔高度 |
| pingStationAltMM | %d 十进制整数(int) | Altitude in mm  以毫米为单位的高度 |
| gpsStatus | %d 十进制整数(int) | The communication and health status of the pingStation GPS  0 = GPS not present or functioning  1 = Not locked  2 = 2D fix  3 = 3D fix  4 = DGPS fix  平台GPS的通信和健康状况  0 = GPS不存在或正在运行  1 =未锁定  2 = 2D修正  3 = 3D修复  4 = DGPS修复 |
| receiverStatus | %d 十进制整数(int) | The communication and health status of the pingStation receiver  0 = functioning normally  1 = excessive communication errors  2 = device not transmitting  pingstation接收器的通信和健康状态  0 =正常运作  1 =过度的通信错误  2 =设备不传输 |

1. **Protocols 协议**
   1. **UDP**

**The pingStation JSON data can be delivered as UDP to a specified host IP address and port number. The UDP destination and port number can be entered using the webpage interface at http://xxx.xxx.xxx.xxx/. As aircraft data is received into the pingStation, it is timestamped and formatted before being pushed to the UDP listener as JSON. Each UDP datagram contains a single aircraft update. The aircraft JSON data will contain the optional “detail” object. Data will be continually streamed out to the UDP listener as aircraft updates arrive. Every 30 seconds a status object will be delivered. The data is dynamic in that only valid fields will be formatted and sent on to the UDP host.**

**To disable UDP send functionality, enter an IP address of 0.0.0.0 on the configuration webpage at** [**http://xxx.xxx.xxx.xxx/**](http://xxx.xxx.xxx.xxx/).

pingStation JSON数据可以作为UDP发送到指定的主机IP地址和端口号。 可以使用http://xxx.xxx.xxx.xxx/上的网页界面输入UDP目标和端口号。 当飞机数据被接收到pingStation中时，它被打上时间戳并格式化，然后作为JSON推送到UDP侦听器。 每个UDP数据报包含一个飞机更新。 飞机的JSON数据将包含可选的“细节”对象。 随着飞机更新到达，数据将不断流出到UDP侦听器。 每30秒会传递一个状态对象。 数据是动态的，只有有效的字段将被格式化并发送到UDP主机。

要禁用UDP发送功能，请在配置网页http://xxx.xxx.xxx.xxx/上输入IP地址0.0.0.0。

* 1. **REST**

**The pingStation data can be accessed in a basic pull model using the REST protocol which will return the JSON formatted data. Data can be accessed by using the GET method to the pingStation URL (xxx.xxx.xxx.xxx).**

**The pingStation base URL is:**

**http://xxx.xxx.xxx.xxx/api/v1/**

**Example resource path are:**

**http://xxx.xxx.xxx.xxx/api/v1/traffic**

**http://xxx.xxx.xxx.xxx/api/v1/status**

**No GET query strings are currently supported to limit returned data sets.**

可以使用REST协议以基本拉模式访问pingStation数据，该协议将返回JSON格式的数据。 数据可以通过使用GET方法访问pingStation URL（xxx.xxx.xxx.xxx）来访问。

pingStation的基本URL是：

http://xxx.xxx.xxx.xxx/api/v1/

示例资源路径是：

http://xxx.xxx.xxx.xxx/api/v1/traffic

http://xxx.xxx.xxx.xxx/api/v1/status

当前不支持GET查询字符串来限制返回的数据集。

* 1. **AVR Mode-S Beast ASCII**

**The pingStation supports the open standard AVR for Mode-S Beast ADS-B messages. This data will be delivered on a TCP connection. The pingStation will be listening for a TCP connection to be established on the port specified by the user. Aircraft update data will be delivered as AVR ASCII on the TCP connection as it is received into the pingStation.**

pingStation支持Mode-S Beast ADS-B消息的开放标准AVR。 这些数据将在TCP连接上传送。 pingStation将侦听在用户指定的端口上建立的TCP连接。 飞机更新数据将作为AVR ASCII在TCP连接中发送，因为它将接收到pingStation。

1. **JSON Example Sentences 示例**
   1. **Traffic Object**

|  |
| --- |
| {  "aircraft": [  {  "icaoAddress":"39C812",  "trafficSource":0,  "latDD":47.538528,  "lonDD":-115.133696,  "altitudeMM":13106400,  "headingDE2":203,  "horVelocityCMS":23149,  "verVelocityCMS":0,  "squawk":1362,  "altitudeType":0,  "callsign":"LEA022H ",  "emitterType":2,  "pingStationGuid":"7541622b4f4c2e59",  "utcSync":1,  "timeStamp":"2017-02-13T14:42:00.111Z",  "detail": {  "navIntegrity":8,  "navAccuracy":2,  "verVelocitySrc":1,  "emergencyStatus":0,  "surveilStatus":0,  "baroaltDiffMM":0,  "sysIntegrityLevel":3,  "airGroundState":0,  "svHeadingType":0,  "verticalVelType":1,  "navPostionAccuracy":10,  "navVelocityAccuracy":2,  "navIntegrityBaro":1,  "tcasAcasOperating":1,  "tcasAcasAdvisory":0,  "identSwActive":0,  "magHeading":0,  "utcCoupledCondition":0  }  },  {  "icaoAddress":"780A70",  "trafficSource":0,  "headingDE2":289,  "horVelocityCMS":24127,  "verVelocityCMS":-32,  "altitudeType":0,  "emitterType":0,  "pingStationGuid":"7541622b4f4c2e59",  "utcSync":1,  "timeStamp":"2017-02-13T14:41:57.189Z",  "detail": {  "navIntegrity":0,  "navAccuracy":2,  "verVelocitySrc":0,  "emergencyStatus":0,  "surveilStatus":0,  "baroaltDiffMM":0,  "sysIntegrityLevel":0,  "airGroundState":0,  "svHeadingType":0,  "verticalVelType":0,  "navPostionAccuracy":0,  "navVelocityAccuracy":2,  "navIntegrityBaro":0,  "tcasAcasOperating":0,  "tcasAcasAdvisory":0,  "identSwActive":0,  "magHeading":0,  "utcCoupledCondition":0  }  }  ]  } |

* 1. **Status Object**

|  |
| --- |
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