AUTO DISCOVERY REMOTE CONTROL

ADRC
GLOSSARY
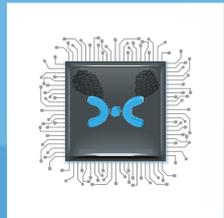
THE INTERNET OF THINGS
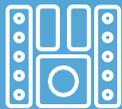
xped

Contents

1 About this document

Document purpose

This document provides a single list of definitions that apply across all Auto Discovery Remote Control documents instead of repeating definitions in each document.

Scope

This document defines terms that relate to Xped's Auto Discovery Remote Control technology.

Contact information

For additional information and queries, email info@xped.com.

2 Definitions

Numeric

802.15.4

802.15.4 is a standard for low data rate wireless personal area networks. It specifies the physical layer and media access control.

The standard is maintained by the Institute of Electrical and Electronics Engineers (IEEE).

A

ACK

Acknowledgement

A network message that acknowledges receipt of data.

Active Device List

The Active Device List is the list of the Things that have been on-boarded to an IoTG's personal area network.

The Active Device List contains the following information for each Thing:

- Nickname
- Device id
- Organisation Unique Identifier (OUID)
- Path to the RML file(s) for the Thing

ADRC

See Auto Discovery Remote Control.

ADRC hub

See Internet of Things Gateway.

ADRC IoT stack

The IoT stack is the licensed component of ADRC and provides the following functionality:

- NFC connectivity to the smartphone
- 802.15.4 wireless connectivity to the IoTG
- A device proxy to manage communications with the manufacturer's application in the Thing
- Security management
- File storage for the RML file(s)

A manufacturer loads the IoT stack into a Thing's microchip.

ADRC server software

The ADRC server software is open source software that is loaded onto an Internet of Things Gateway (IoTG) and provides the following functionality:

- A pairing table to store the configuration information for each Thing
- A file system to store the RML file that describes the capabilities and attributes of a Thing
- Device management to manage all the Things in the IoTG's personal area network
- Certificate and key generation for remote access

ADRC system services

See ADRC server software.

ADRC wand

ADRC Wand Patent # 2015/0044966 provides a wand that can carry out the NFC tap portion of the ADRC process for smart device that do not have an integrated NFC capability.

AES

Advanced Encryption Standard

During the on-boarding of each Thing, the device browser (DeB) generates a 128-bit AES security key for each Thing.

API

Application Programming Interface

A published set of interface routines and protocols.

Arduino

An open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physical world.

Attribute

In both XML and RML, attributes are used to describe elements, or to provide additional information about elements. An attribute takes the form of *attribute=.*

Auto Discovery Remote Control

The Xped platform that allows all of a user's electronic devices to be connected and controlled from a single smartphone and using a single NFC tap.

It defines the process for on-boarding and controlling a Thing, both locally and remotely.

B

Big data

Big data refers to the technology that is used to handle volumes of data that are too large to process using traditional database and software techniques.

C

CA

See Certificate Authority.

Certificate

Digital certificates are used to validate the identity of the sending and receiving parties in order to set up trusted and secure communications between the two parties. The certificate contains the public key of the party.

In ADRC, certificates are used to allow a user to control and monitor Things over the internet.

Certificate Authority

A Certificate Authority is a trusted third party that issues certificates.

Xped is the Certificate Authority for ADRC and issues a certificate for each Internet of Things Gateway (IoTG).

Cortex M3 MCU

A processor on a microchip developed specifically for low-cost microcontroller applications.

D

D-Bus

D-Bus is an inter-process communication and remote procedure call mechanism that allows communication between multiple computer programs (processes) concurrently running on the same machine.

DeB

See Device Browser.

Device Browser

The device browser (DeB) is the app that provides the user interface on the smartphone for controlling and monitoring Things.

Device Browser app

The device browser is downloaded as an app to the smartphone or other smart device.

Device id

The device id is created by the IoTG and provides each Thing with an id that is unique within that IoTG's personal area network.

Domain

In ADRC, a domain is the collective name given to all the Things connected to one IoTG.

A user may have access to multiple domains from a single device browser. For example, a domain could be home, holiday house, office and so on.

E

EAP

Extensible Authentication Protocol

EAP is an authentication framework for wireless networks.

Element

An XML or RML document is made up of elements. An element start tag takes the form of <elementname>. An element end tag takes the form of </elementname>. An XML or RML element is everything from the element's start tag to the element's end tag, inclusive of the start and end tags. An element can contain child elements, text and attributes.

Equinox

The Integrated Development Environment created by Xped for developing RML.

Etag

Entity tag

An etag is used to identify whether cached data is still current. An etag is an identifier assigned by a web server to a specific version of a resource. If the resource changes, a new and different etag is assigned. Etags can be compared to determine whether two representations of a resource are the same or not.

Ethernet connection

Ethernet is a wired local area network technology.

In ADRC, the IoTG connects to the home Wi-Fi modem via an Ethernet connection.

F

G

H

Hashing

Hashing is used in security systems to verify that data has not been tampered with.

The original data is input into a cryptographic algorithm to create a hash value that is sent with the original data. The recipient recreates the hash value and verifies it against the original hash value to determine whether the data has been tampered with.

Host format

See RCP.host.

HTML

Hyper Text Markup Language

HTTP is a markup language used for describing web pages.

HTTP

Hypertext Transport Protocol

HTTP is the protocol used by the World Wide Web that determines how messages are formatted, transmitted and actioned.

Hub

See Internet of Things Gateway.

I

IDE

Integrated Development Environment

An IDE is a packaged development framework that provides a more automated environment for software developers.

Internet of Things

The Internet of Things (IoT) is about connecting electronic devices (Things) to each other so these Things can communicate and exchange data. It is also about the interaction between people and Things, and about process control in everyday life.

IoT

See Internet of Things.

IoT stack

See ADRC IoT stack.

IoTG

See Internet of Things Gateway.

IMEI

International Mobile Station Equipment Identity

The IMEI is a number that uniquely identifies the physical mobile phone.

J

JSON

JavaScript Object Notation

JSON is a lightweight data-interchange format, based on a subset of the JavaScript Programming Language.

K

L

M

M2M

Machine to Machine

MAC

Medium Access Control

A layer in a network protocol stack that coordinates access to the transport medium, such as wire or air.

MCU

Micro Controller Unit

An MCU is a computer on a single microchip.

mDNS

Multicast Domain Name System

The mDNS protocol is published as RFC 6762. It uses IP multicast User Datagram Protocol (UDP) packets and is implemented by the Apple Bonjour and Linux nss-mdns services. mDNS can work in conjunction with DNS Service Discovery (DNS-SD), a companion zero-configuration technique specified separately in RFC 6763.

Metadata

Metadata is data about data. It describes the characteristics and context of the actual data, such as type, relationships, format and location.

Mutual authentication

Mutual authentication is a technology process in which the two parties in a communications link authenticate each other to verify that they are communicating with legitimate entities.

MVC

Model View Controller

Model–view–controller (MVC) is **a** software architectural pattern for implementing user interfaces. It divides **a** given software application into the three interconnected parts, so as to separate internal representations of information from the way that information is presented to or received from the user.

N

NDEF

NFC Data Exchange Format

Near Field Communication Data Exchange Format

NDEF is a standardised data format that can be used to exchange information between compatible NFC devices.

NFC

Near Field Communication

NFC is a wireless communications protocol that enables two electronic devices, one of which is usually a portable device such as a smartphone, to establish communication by bringing them within close proximity of each other.

NFC based coupons

Xped has a patent (#2013/0176106) for NFC based coupons. This covers the ability of a vendor to push data and triggers to a smart device after it completes an NFC payment cycle during a tap event.

For example, the data pushed to the smart device can be vouchers that can be used by the customer next time they shop. The trigger portion of the information can time out the voucher or make it useable after a certain time has elapsed.

Nickname

A nickname is the name a user gives to a Thing within the device browser.

O

OEM

Original Equipment Manufacturer

On-boarding

On-boarding is the process of connecting a Thing into a personal area network.

The user achieves this by simply tapping the user's NFC-enabled smartphone against an ADRC-enabled Thing.

Ontology

An ontology is a formal definition of all the Things that exist in a particular application domain and how they relate to one another.

OUID

Organisationally Unique Identifier

An OUID is a 24-bit number that uniquely identifies a vendor, manufacturer, or other organisation globally. An OUID is assigned by the Institute of Electrical and Electronics Engineers (IEEE).

OWL

Web Ontology Language

OWL is an initiative of the World Wide Web Consortium. It is a semantic web language designed to represent rich and complex knowledge about things, groups of things, and relations between things.

P

PAN

Personal Area Network

In ADRC, each IoTG has a wireless personal network that connects Things using 802.15.4 or similar technology.

PAN id

A number generated by an IoTG that represents the personal area network that is controlled by that IoTG.

PCB

Printed Circuit Board

Pairing

The process of making a Thing known to an IoTG is called pairing.

Pairing table

The pairing table is held in the IoTG and contains the following information for each Thing:

- Addressing information
- Security key, which provides secure communications between the IoTG and a Thing
- Pairing status

PHY

PHY is an abbreviation for the physical layer of the Open Systems Interconnection (OSI) model and refers to the circuitry required to implement physical layer functions.

PIN

Personal Identification Number

A PIN can be set to control access to an IoTG or to an individual Thing.

Q

R

RAM

Random Access Memory

Raspberry Pi

The Raspberry Pi is a low cost, credit-card sized computer developed in the United Kingdom by the Raspberry Pi Foundation.

RCP

See Resource Control Protocol.

RCP.host

RCP.host format is the messaging protocol format used to communicate between a device browser and an IoTG.

RCP.wire

RCP.wire format is the messaging protocol format used to communicate between a Thing and an IoTG.

RDF

Resource Description Framework

RDF is a set of World Wide Web Consortium (W3C) specifications originally designed as a metadata data model.

Render

The process of transforming data into pictures (icons).

Resource Control Protocol

The Resource Control Protocol (RCP) is the protocol that is used to transfer RML files and commands between a Thing, an Internet of Things Gateway and a device browser.

Resource Modelling Language

Resource Modelling Language (RML) is an XML-based language created by Xped. RML describes a Thing and its functionality.

RML files are stored within a Thing and these RML files are sent from the Thing to the IoTG and DeB during the on-boarding process. The IoTG uses the RML file to control and monitor the Thing, whilst DeB uses the RML file to add the Thing and its functions into the user interface. The RML files are also known as self-describing profiles.

REST

Representational State Transfer

REST is an architecture for how to access web services.

Reverse proxy

A reverse proxy is a type of proxy server that coordinates resources on behalf of a client from one or more servers.

RML

See Resource Modelling Language.

ROM

Read Only Memory

S

Security key

A security key is generated by DeB for each Thing. The security key is used to secure communications between a Thing and an IoTG.

Self-describing profile

See Resource Modelling Language.

SIM

Subscriber Identity Module

A SIM is an integrated circuit chip that is intended to securely store the international mobile subscriber identity number and its related key, which are used to identify and authenticate mobile phone subscribers.

SPI

Serial Peripheral Interface

The SPI is a synchronous serial communication interface specification used for short distance communication.

SSID

Service Set Identifier

SSID is a unique identifier attached to the header of packets sent over a wireless local-area network (WLAN) that acts as a password when a mobile device tries to connect to the service.

T

TCP

Transmission Control Protocol

TCP is a core protocol of the Internet protocol suite.

Theme

If a Thing has multiple RML files, each file is called a theme.

Thing

A Thing is an ADRC-enabled electronic device that can be connected into an ADRC personal area network. A Thing is anything with an on/off switch.

Touchpoint logo

A touchpoint logo is the ⟩·⟨ logo on a Thing that indicates where the user should tap a smartphone to on-board a Thing.

TLS

Transport Layer Security

TLS is a cryptographic protocol that provides communications security over a computer network.

U

UART

Universal Asynchronous Receiver Transmitter

UART translates data between parallel and serial forms.

UI

User Interface

Unicode

Unicode is a computing industry standard for the consistent encoding, representation, and handling of text expressed in most of the world's writing systems.

Unit

A unit is an item of hardware or software that performs a well-defined function. A Thing contains at least one unit. Some Things may contain more than one unit, for example, a television with a built-in DVD player. A unit and its functions are described in an RML file.

In terms of networking, a Thing has a network address and a unit does not. RCP is designed so that messages are delivered to a unit.

URL

Uniform Resource Locator

A synonym for web address.

UUID

Universally Unique Identifier

A universally unique identifier (UUID) is an identifier standard that is used in software construction.

In ADRC, the UUID is used to identify each IoTG account on the XMPP server.

V

W

Wi-Fi

A technology that allows electronic devices to connect to a wireless LAN network

Wire format

See RCP.wire.

Wireless channel

In ADRC, the wireless channel is the 802.15.4 channel that the IoTG uses to communicate with a Thing.

WLAN

Wireless Local Area Network WLAN

A WLAN is a wireless computer network that links two or more devices using a wireless distribution method within a limited area such as a home, school, computer laboratory, or office building.

WPA key

Wi-Fi Protected Access key

The WPA key is used to secure communications on a Wi-Fi network.

X

XML

Extensible Markup Language

XML is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.

XMPP

Extensible Messaging and Presence Protocol

XMPP is a communications protocol for message-oriented middleware based on XML.

In ADRC, an XMPP server is used to enable and secure remote access from a smartphone to an IoTG.

XMPP account

Each IoTG and each IMEI (smartphone) has an account on the XMPP server to enable and secure remote access from a smartphone to an IoTG.

Xped

eXtreme technology pedigree

Xped is the corporation that has created the ADRC platform.

Y

Yocto

The Yocto Project is an open source collaboration project that provides templates, tools and methods to assist with creating custom Linux-based systems for embedded products regardless of the hardware architecture.

Z

Zeroconf

Zero Configuration Networking

Zero Configuration Networking is a set of technologies that allows two or more computers to communicate with each other without any external configuration.

Zigbee

Zigbee is a protocol for short-range low-rate wireless data transfer.

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