

# PP-Module for Bluetooth



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**National Information Assurance Partnership**

## Revision History

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# 1 Introduction

## 1.1 Overview

The scope of the Bluetooth is to describe the security functionality of Bluetooth technology in terms of [ ] and to define functional and assurance requirements for the Bluetooth capability of mobile devices and operating systems. This is intended for use with the following s:

- General Purpose Operating System (GPOS) Protection Profile, Version 4.2.1
- Mobile Device Fundamentals (MDF) Protection Profile, Version 3.1

These s are valid because consumer-grade desktop and mobile devices may both have Bluetooth hardware radios and so both desktop and mobile operating systems have the software/firmware capability to allow products to use them.

## 1.2 Terms

The following sections list Common Criteria and technology terms used in this document.

### 1.2.1 Common Criteria Terms

Assurance	Grounds for confidence that a TOE meets the SFRs <a href="#">[CC]</a> .
Base Protection Profile (Base-PP)	Protection Profile used as a basis to build a PP-Configuration.
Common Criteria (CC)	Common Criteria for Information Technology Security Evaluation (International Standard ISO/IEC 15408).
Common Criteria Testing Laboratory	Within the context of the Common Criteria Evaluation and Validation Scheme (CCEVS), an IT security evaluation facility, accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and approved by the NIAP Validation Body to conduct Common Criteria-based evaluations.
Common Evaluation Methodology (CEM)	Common Evaluation Methodology for Information Technology Security Evaluation.
Distributed TOE	A TOE composed of multiple components operating as a logical whole.
Operational Environment (OE)	Hardware and software that are outside the TOE boundary that support the TOE functionality and security policy.
Protection Profile (PP)	An implementation-independent set of security requirements for a category of products.
Protection Profile Configuration (PP-Configuration)	A comprehensive set of security requirements for a product type that consists of at least one Base-PP and at least one PP-Module.
Protection Profile Module (PP-Module)	An implementation-independent statement of security needs for a TOE type complementary to one or more Base Protection Profiles.
Security Assurance Requirement (SAR)	A requirement to assure the security of the TOE.
Security Functional Requirement (SFR)	A requirement for security enforcement by the TOE.
Security Target (ST)	A set of implementation-dependent security requirements for a specific product.

TOE Security Functionality (TSF)	The security functionality of the product under evaluation.
TOE Summary Specification (TSS)	A description of how a TOE satisfies the SFRs in an ST.
Target of Evaluation (TOE)	The product under evaluation.

### 1.2.2 Technical Terms

Authentication	Verifying the identity of communicating devices based on their Bluetooth address. Bluetooth does not provide native user authentication.
Authorization	Allowing the control of resources by ensuring that a device is authorized to use a service before permitting it to do so.
BD_ADDR	The Bluetooth device Address, which is used to identify a Bluetooth device.
BR/EDR	Bluetooth basic rate (BR) and enhanced data rate (EDR).
BR/EDR Controller	A term referring to the Bluetooth Radio, Baseband, Link Manager, and HCI layers.
BR/EDR Piconet Physical Channel	A Channel that is divided into time slots in which each slot is related to an RF hop frequency. Consecutive hops normally correspond to different RF hop frequencies and occur at a standard hop rate of 1600 hops per second. These consecutive hops follow a pseudo-random hopping sequence, hopping through a 79 RF channel set, or optionally fewer channels when Adaptive Frequency Hopping (AFH) is in use. BR/EDR/LE Bluetooth basic rate (BR), enhanced data rate (EDR) and low energy (LE).
Bluetooth	A wireless communication link operating in the unlicensed ISM band at 2.4 GHz using a frequency hopping transceiver. It allows real-time AV and data communications between Bluetooth Hosts. The link protocol is based on time slots.
Bluetooth Baseband	The part of the Bluetooth system that specifies or implements the medium access and physical layer procedures to support the exchange of real-time voice, data information streams, and ad hoc networking between Bluetooth devices.
Bluetooth Controller	A generic term referring to a Primary Controller with or without a Secondary Controller.
Bluetooth Device	A device that is capable of short-range wireless communications using the Bluetooth system.
Bluetooth Device Address	A 48 bit address used to identify each Bluetooth device.
Connect (to service)	The establishment of a connection to a service. If not already done, this also includes establishment of a physical link, logical transport, logical link and L2CAP channel.
Connectable device	A BR/EDR device in range that periodically listens on its page scan physical channel and will respond to a page on that channel. An LE device that is advertising using a connectable advertising event.
Connected devices	Two BR/EDR devices and with a physical link between them. Connecting A phase in the communication between devices when a connection between the devices is being established. The connecting phase follows after the link establishment phase is completed.
Connection	An interaction between two peer applications or higher layer protocols mapped onto an L2CAP channel.
Connection establishment	A procedure for creating a connection mapped onto a channel.
Connection event	A series of one or more pairs of interleaving data packets sent between a master and a slave on the same physical channel.
Creation of a secure connection	A procedure of establishing a connection, including authentication and encryption.

Creation of a trusted relationship	A procedure where the remote device is marked as a trusted device. This includes storing a common link key for future authentication, or pairing, when a link key is not available.
Device discovery	A procedure for retrieving the Bluetooth device address, clock, class-of-device field and used page scan mode from discoverable devices.
Discoverable Mode	A Bluetooth device that is performing inquiry scans in BR/EDR or advertising with a discoverable or connectable advertising event with a discoverable flag set in LE.
Discoverable device	A BR/EDR device in range that periodically listens on an inquiry scan physical channel and will respond to an inquiry on that channel. An LE device in range that is advertising with a connectable or scannable advertising event with a discoverable flag set in the advertising data. This device is in the discoverable mode.
Discovery procedure	A Bluetooth device that is carrying out the inquiry procedure in BR/EDR or scanning for advertisers using a discoverable or connectable advertising event with a discoverable flag set in LE.
Host	A logical entity defined as all of the layers below the non-core profiles and above the Host Controller interface (HCI); i.e. Bluetooth Host attached to a Bluetooth Controller may communicate with other Bluetooth Hosts attached to their Controllers as well.
L2CAP Channel	A logical connection on L2CAP level between two devices serving a single application or higher layer protocol.
L2CAP Channel establishment	A procedure for establishing a logical connection on L2CAP level.
LMP authentication	An LMP level procedure for verifying the identity of a remote device.
LMP pairing	A procedure that authenticates two devices and creates a common link key that can be used as a basis for a trusted relationship or a (single) secure connection.
Link	Shorthand for a logical link.
Link establishment	A procedure for establishing the default ACL link and hierarchy of links and channels between devices.
Link key	A secret that is known by two devices and is used to authenticate the link.
Logical Link Control and Adaptation Protocol (L2CAP)	A data link protocol used in the Bluetooth protocol stack.
Logical link	The lowest architectural level used to offer independent data transport services to clients of the Bluetooth system.
Name discovery	A procedure for retrieving the user-friendly name (the Bluetooth device name) of a connectable device.
OBEX Push	A method of Bluetooth one-way file transfer that is initiated by the entity that is providing the file.
PIN	A user-friendly value that can be used to authenticate connections to a device before pairing has taken place.
Paired device	A Bluetooth device for which a link key has been created (either before connection establishment was requested or during connecting phase).
Piconet	A collection of devices occupying a shared physical channel where one of the devices is the Piconet Master and the remaining devices are connected to it.
Piconet Master	The BR/EDR device in a piconet whose Bluetooth Clock and Bluetooth Device Address are used to define the piconet physical channel characteristics.
Piconet Slave	Any BR/EDR device in a piconet that is not the Piconet Master, but is connected to the Piconet Master.
RFCOMM	A transport protocol used in the Bluetooth protocol stack that emulates RS-232 serial port connections.
Trusted Device	A device that has a fixed relationship with another device and has full access to all services.

Unknown device	A Bluetooth device for which no information (Bluetooth Device Address, link key or other) is stored.
Untrusted Device	A device that does not have an established relationship with another Bluetooth device, which results in the untrusted device receiving restricted access to services.

### 1.3 Compliant Targets of Evaluation

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The Target of Evaluation (TOE) in this is a product that implements Bluetooth functionality. This describes the extended security functionality of Bluetooth in terms of CC. This PP-Module extends the Protection Profile for General Purpose Operating Systems or Mobile Device Fundamentals. A compliant TOE will meet all mandatory SFRs defined in this PP-Module in addition to the mandatory SFRs of its claimed Base-PP. For each Base-PP, this PP-Module refines several of the Base-PP's SFRs so that they can accommodate the Bluetooth functionality defined by the PP-Module. A compliant TOE will claim all selection-based SFRs from this PP-Module and its Base-PP as needed based on the relevant selections in other requirements being chosen.

Note that [MDF], evaluation activities require certain tests to be performed against all radios present on the device. When the TOE also claims conformance to this PP-Module, those tests are executed against the Bluetooth radio as well.

Also note that each Base-PP defines its own requirements for protection of data at rest. When the TOE also claims conformance to this PP-Module, any data that is used by the TOE's Bluetooth implementation is expected to be stored using the same protection mechanisms.

#### 1.3.1 TOE Boundary

The Bluetooth implementation is a logical component executing on an end user personal computing or mobile device. As such, the TOE must rely heavily on the TOE's operational environment (host platform, network stack, and operating system) for its execution domain and its proper usage. The TOE will rely on the IT environment to address much of the security functionality related to administrative functions. The physical boundary of the TOE includes the physical device on which it is installed, as this device will contain an internal or external Bluetooth radio that is used as the physical medium for transmitting and receiving data over the Bluetooth logical channel.

### 1.4 Use Cases

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Requirements in this PP-Module are designed to address the security problems in at least the following use cases. These use cases are intentionally very broad, as many specific use cases exist within these larger categories.

#### [USE CASE 1] General-Purpose Operating System

This use case is for a Bluetooth TOE that is part of a general-purpose operating system. Specifically, the Bluetooth TOE is expected to be part of the operating system itself and not a standalone third-party application that is installed on top of it.

#### [USE CASE 2] Mobile Device

This use case is for a Bluetooth TOE that is part of a mobile operating system that runs on a mobile device. Specifically, the Bluetooth TOE is expected to be part of the mobile operating system itself and not a standalone third-party application that is acquired from the mobile vendor's application store.

# 2 Conformance Claims

## Conformance Statement

An ST must claim exact conformance to this , as defined in the CC and CEM addenda for Exact Conformance, Selection-Based SFRs, and Optional SFRs (dated May 2017).

## CC Conformance Claims

This is conformant to Parts 2 (extended) and 3 (conformant) of Common Criteria Version 3.1, Revision 5.

## PP Claim

This does not claim conformance to any Protection Profile.

## Package Claim

This does not claim conformance to any packages.

## Conformance Statement

This inherits exact conformance as required from the specified and as defined in the and addenda for Exact Conformance, Selection-Based SFRs, and Optional SFRs (dated May 2017).

The following PPs and PP-Modules are allowed to be specified in a PP-Configuration with this PP-Module.

- PP-Module for VPN Client, Version 2.1
- PP-Module for MDM Agent, Version 1.0
- PP-Module for WLAN Clients, Version 1.0

## CC Conformance Claims

This is conformant to Parts 2 (extended) and 3 (conformant) of Common Criteria Version 3.1, Release 5 [ ].

## Package Claims

There are no package claims for this PP-Module.

# 3 Security Problem Description

All threats, assumptions, organizational security policies, and/or objectives that apply to this PP-Module are inherited from the Base-PP to which the TOE also conforms. This PP-Module does not add or remove any elements to the security problem definition given in the Base-PP. The SFRs defined in this PP-Module provide additional mechanisms for mitigating the threats already defined in the Base-PPs due to the fact that including a Bluetooth implementation introduces a new external interface to the underlying general-purpose OS or mobile device platform.

## 3.1 Threats

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No threats have been identified that are specific to Bluetooth technology. However, any organizational security policies defined in the Base-PPs will also apply to the portion of the TOE that implements Bluetooth.

**T.PLACEHOLDER**  
placeholder

## 3.2 Assumptions

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This PP-Module defines no additional assumptions.

## 3.3 Organizational Security Policies

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**P.PLACEHOLDER**  
No organizational policies have been identified that are specific to Bluetooth technology. However, any objectives defined in the Base-PPs will also apply to the portion of the TOE that implements Bluetooth.



# 4 Security Objectives

## 4.1 Security Objectives for the TOE

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O.PLACEHOLDER  
placeholder

## 4.2 Security Objectives for the Operational Environment

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This PP-Module does not define any objectives for the Operational Environment.

No environmental security objectives have been identified that are specific to Bluetooth technology. However, any environmental security objectives defined in the Base-PPs will also apply to the portion of the TOE that implements Bluetooth.

## 4.3 Security Objectives Rationale

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This section describes how the assumptions, threats, and organization security policies map to the security objectives.

Table 1: Security Objectives Rationale

Threat, Assumption, or OSP	Security Objectives	Rationale
T.PLACEHOLDER	O.PLACEHOLDER	placeholder
P.PLACEHOLDER	O.PLACEHOLDER	aaaaa

# 5 Security\_Requirements

This chapter describes the security requirements which have to be fulfilled by the product under evaluation. Those requirements comprise functional components from Part 2 and assurance components from Part 3 of [CC]. The following conventions are used for the completion of operations:

- **Refinement** operation (denoted by **bold text** or ~~striktthrough text~~): is used to add details to a requirement (including replacing an assignment with a more restrictive selection) or to remove part of the requirement that is made irrelevant through the completion of another operation, and thus further restricts a requirement.
- **Selection** (denoted by *italicized text*): is used to select one or more options provided by the [CC] in stating a requirement.
- **Assignment** operation (denoted by *italicized text*): is used to assign a specific value to an unspecified parameter, such as the length of a password. Showing the value in square brackets indicates assignment.
- **Iteration** operation: is indicated by appending the SFR name with a slash and unique identifier suggesting the purpose of the operation, e.g. "/EXAMPLE1."

## 5.1 MDF PP Security Functional Requirements Direction

In a PP-Configuration that includes MDF PP, the TOE is expected to rely on some of the security functions implemented by the Mobile Device as a whole and evaluated against the MDF PP. The following sections describe any modifications that the ST author must make to the SFRs defined in the MDF PP in addition to what is mandated by [Section 5.7 TOE Security Functional Requirements](#).

### 5.1.1 Modified SFRs

The SFRs listed in this section are defined in the MDF PP and relevant to the secure operation of the TOE.

## 5.2 Security Audit (FAU)

### FAU\_GEN.1 Audit Data Generation

FAU\_GEN.1.1

In addition to the auditable events defined in the [MDF PP], the mobile device shall generate audit records for audit events related to Bluetooth functionality. A conformant TOE shall append Table 1 in the [MDF PP] with the following mandatory auditable events:

Requirement	Auditable Events	Additional Audit Record Contents
FCS_CKM_EXT.8	None.	
FIA_BLT_EXT.1	Failed user authorization of Bluetooth device.	User authorization decision (e.g., user rejected connection, incorrect pin entry).
	Failed user authorization for local Bluetooth Service.	Bluetooth address and name of device. Bluetooth profile. Identity of local service with [ <b>selection</b> : <i>service ID, profile name</i> ].
FIA_BLT_EXT.2	Initiation of Bluetooth connection.	Bluetooth address and name of device.
	Failure of Bluetooth connection.	Reason for failure.
FIA_BLT_EXT.3 (optional)	Duplicate connection attempt.	BD_ADDR of connection attempt.
FIA_BLT_EXT.4	None.	
<a href="#">FIA_BLT_EXT.5</a> (if claimed)	None.	

FIA_BLT_EXT.6	None.
FIA_BLT_EXT.7	None.
FTP_BLT_EXT.1	None.
FTP_BLT_EXT.2	None.
FTP_BLT_EXT.3/BR	None.
<a href="#">FTP_BLT_EXT.3/LE</a> (if claimed)	None.

**Application Note:** It is not feasible for the FIA\_BLT\_EXT.3 event to be audited if the rejection is performed at the HCI layer because the Bluetooth standard does not provide a notification interface for this behavior in the HCI. This is why the event is labeled as optional. However, if the rejection is performed above the HCI layer, it is expected that a conformant TOE should implement this functionality.

## Evaluation Activities ▼

[FAU\\_GEN.1:](#)

### Evaluation Activity ▼

#### TSS

*There are additional auditable events that serve to extend the [FAU\\_GEN.1](#) SFR found in the Base-PP.*

*This SFR is evaluated in the same manner as defined by the Evaluation Activities for the Base-PP. The only difference is that the evaluator shall also assess the auditable events required for this PP-Module in addition to those defined in the Base-PP.*

## 5.3 Security Management (FMT)

### FMT\_SMF\_EXT.1 Specification of Management Functions

FMT\_SMF\_EXT.1.1

This PP-Module prescribes the following changes to this SFR as defined in the Base-PP:

- The list of radios specified in the assignment for management function 4 ("enable/disable [**assignment:** *list of all radios*]") will include Bluetooth radios. Bluetooth BR/EDR and Bluetooth LE will be listed separately if the TSF provides the ability to enable/disable them separately (i.e., if management function BT-3 below is claimed). Otherwise, both interfaces will be treated as one radio for that assignment.
- The following additional management functions are defined, and should be appended to the table in the Base-PP:

Function	FMT_ SMF_ EXT.1	FMT_ MOF_ EXT.1.1	Admin	FMT_ MOF_ EXT.1.2
BT-1. Configure the Bluetooth trusted channel. <ul style="list-style-type: none"> <li>• Disable/enable the Discoverable (for BR/EDR) and Advertising (for LE) modes;</li> </ul>	M	O	O	O
BT-2. Change the Bluetooth device name (separately for BR/EDR and LE);	O	O	O	O
BT-3. Provide separate controls for turning the BR/EDR and LE radios on and off;	O	O	O	O
BT-4. Allow/disallow the following additional wireless technologies to be	O	O	O	O

used with Bluetooth: [**selection:** Wi-Fi, NFC, [**assignment:** other wireless technologies]];

BT-5. Configure allowable methods of Out of Band pairing (for BR/EDR and LE);	O	O	O	O
BT-6. Disable/enable the Discoverable (for BR/EDR) and Advertising (for LE) modes separately;	O	O	O	O
BT-7. Disable/enable the Connectable mode (for BR/EDR and LE);	O	O	O	O
BT-8. Disable/enable the Bluetooth [ <b>assignment:</b> list of Bluetooth service and/or profiles available on the OS (for BR/EDR and LE)];	O	O	O	O
BT-9. Specify minimum level of security for each pairing (for BR/EDR and LE);	O	O	O	O

**Application Note:** As is the case with the [MDF PP], the first column lists the management function, the second column lists whether it is mandatory to implement the function and the remaining columns indicate whether it is mandatory, optional, or prohibited to implement the function by role as follows:

- The third column indicates functions that are to be restricted to the user (i.e. not available to the administrator).
- The fourth column indicates functions that are available to the administrator. These functions can still be available to the user, as long as the function is not restricted to the administrator (column 5).
- The fifth column indicates whether the function is to be restricted to the administrator when the device is enrolled and the administrator applies the indicated policy (i.e., MDM administration). This does not prevent the user from modifying a setting to make the function stricter, but the user cannot undo the configuration enforced by the administrator.

For columns 2-5, an 'M' indicates that it is mandatory, an 'O' indicates that it is optional, and a '-' indicates that it is prohibited.

(BT-1.) Management of the Discoverable and Advertising mode and management of the Bluetooth device name are mandatory. All other management functions for Bluetooth are currently objective.

(BT-2. optional) Requires management of the Bluetooth device name separately for BR/EDR and LE radios.

(BT-4. optional) May include disabling Wi-Fi being used as a part of Bluetooth High Speed and/or disabling NFC as an Out of Band pairing method for Bluetooth. May also include other wireless technologies beyond those already specified.

(BT-8. optional) The Bluetooth services and/or profiles that may be disabled should be listed for the user or administrator either by service and/or profile name or by the types of applications for which the service and/or profile is used.

(BT-9. optional) The minimum level of security permitted may be configurable for each individual pairing or for all Bluetooth pairings.

- If the TSF supports any of the BR/EDR security modes in the following list; it should provide a mechanism for the user to choose the minimum level of security to enforce for a particular device during the pairing process: Security Mode 1 (any level); Security Mode 2; (any level); Security Mode 3; (any level); Security Mode 4; Levels 0;1;2 (aside from the services permitted to use Mode 4; Level 0 in Bluetooth Core Specification version 4.2; Vol. 3; Part C; p. 325).
- If the TSF supports any of the LE security modes in the following list; it should provide a mechanism for the user to choose the minimum level of security to enforce for a particular device during the pairing process: Security Mode 1: Levels 1, 2; Security Mode 2, (any level).
- Examples of levels of security are the use of legacy pairing; the use of different types of Secure Simple Pairing; a requirement for Man-in-the-Middle protection; the enforcement of Secure Connections Only mode; etc.

## Evaluation Activity ▼

### TSS

The evaluator shall ensure that the TSS includes a description of the Bluetooth profiles and services supported and the Bluetooth security modes and levels supported by the TOE.

If function BT-4, "Allow/disallow additional wireless technologies to be used with Bluetooth," is selected, the evaluator shall verify that the TSS describes any additional wireless technologies that may be used with Bluetooth, which may include Wi-Fi with Bluetooth High Speed and/or NFC as an Out of Band pairing mechanism.

If function BT-5, "Configure allowable methods of Out of Band pairing (for BR/EDR and LE)," is selected, the evaluator shall verify that the TSS describes when Out of Band pairing methods are allowed and which ones are configurable.

If function BT-8, "Disable/enable the Bluetooth services and/or profiles available on the OS (for BR/EDR and LE)," is selected, the evaluator shall verify that all supported Bluetooth services are listed in the TSS as manageable and, if the TOE allows disabling by application rather than by service name, that a list of services for each application is also listed.

If function BT-9, "Specify minimum level of security for each pairing (for BR/EDR and LE)," is selected, the evaluator shall verify that the TSS describes the method by which the level of security for pairings are managed, including whether the setting is performed for each pairing or is a global setting.

### Guidance

There are no additional guidance evaluation activities for this SFR beyond what is defined in the Base-PP. The evaluator shall ensure that the management functions defined in the PP-Module are described in the guidance to the same extent required for the Base-PP management functions.

### Tests

The evaluator shall use a Bluetooth-specific protocol analyzer to perform the following tests:

- **Test 1:** The evaluator shall disable the Discoverable mode and shall verify that other Bluetooth BR/EDR devices cannot detect the TOE. The evaluator shall use the protocol analyzer to verify that the TOE does not respond to inquiries from other devices searching for Bluetooth devices. The evaluator shall enable Discoverable mode and verify that other devices can detect the TOE and that the TOE sends response packets to inquiries from searching devices.

The following tests are conditional on if the corresponding function is included in the ST:

- **Test 2:** (conditional): The evaluator shall examine Bluetooth traffic from the TOE to determine the current Bluetooth device name, change the Bluetooth device name, and verify that the Bluetooth traffic from the TOE lists the new name. The evaluator shall examine Bluetooth traffic from the TOE to determine the current Bluetooth device name for BR/EDR and LE. The evaluator shall change the Bluetooth device name for LE independently of the device name for BR/EDR. The evaluator shall verify that the Bluetooth traffic from the TOE lists the new name.
- **Test 3:** (conditional): The evaluator shall disable Bluetooth BR/EDR and enable Bluetooth LE. The evaluator shall examine Bluetooth traffic from the TOE to confirm that only Bluetooth LE traffic is present. The evaluator shall repeat the test with Bluetooth BR/EDR enabled and Bluetooth LE disabled, confirming that only Bluetooth BR/EDR is present.
- **Test 4:** (conditional): For each additional wireless technology that can be used with Bluetooth as claimed in the ST, the evaluator shall revoke Bluetooth permissions from that technology. If the set of supported wireless technologies includes Wi-Fi, the evaluator shall verify that Bluetooth High Speed is not able to send Bluetooth traffic over Wi-Fi when disabled. If the set of supported wireless technologies includes NFC, the evaluator shall verify that NFC cannot be used for pairing when disabled. For any other supported wireless technology, the evaluator shall verify that it cannot be used with Bluetooth in the specified manner when disabled. The evaluator shall then re-enable all supported wireless technologies and verify that all functionality that was previously unavailable has been restored.
- **Test 5:** (conditional): The evaluator shall attempt to pair using each of the Out of Band pairing methods, verify that the pairing method works, iteratively disable each pairing method, and verify that the pairing method fails.
- **Test 6:** (conditional): The evaluator shall enable Advertising for Bluetooth LE, verify that the advertisements are captured by the protocol analyzer, disable Advertising, and verify that no advertisements from the device are captured by the protocol analyzer.
- **Test 7:** (conditional): The evaluator shall enable Connectable mode and verify that

other Bluetooth devices may pair with the TOE and (if the devices were bonded) re-connect after pairing and disconnection. For BR/EDR devices: The evaluator shall use the protocol analyzer to verify that the TOE responds to pages from the other devices and permits pairing and re-connection. The evaluator shall disable Connectable mode and verify that the TOE does not respond to pages from remote Bluetooth devices, thereby not permitting pairing or re-connection. For LE: The evaluator shall use the protocol analyzer to verify that the TOE sends connectable advertising events and responds to connection requests. The evaluator shall disable Connectable mode and verify that the TOE stops sending connectable advertising events and stops responding to connection requests from remote Bluetooth devices.

- **Test 8:** (conditional): For each supported Bluetooth service and/or profile listed in the TSS, the evaluator shall verify that the service or profile is manageable. If this is configurable by application rather than by service and/or profile name, the evaluator shall verify that a list of service and/or profiles for each application is also listed.
- **Test 9:** (conditional): The evaluator shall allow low security modes/levels on the TOE and shall initiate pairing with the TOE from a remote device that allows only something other than Security Mode 4/Level 3 or Security Mode 4/Level 4 (for BR/EDR), or Security Mode 1/Level 3 (for LE). (For example, a remote BR/EDR device may claim Input/Output capability "NoInputNoOutput" and state that man-in-the-middle (MiTM) protection is not required. A remote LE device may not support encryption.) The evaluator shall verify that this pairing attempt succeeds due to the TOE falling back to the low security mode/level. The evaluator shall then remove the pairing of the two devices, prohibit the use of low security modes/levels on the TOE, then attempt the connection again. The evaluator shall verify that the pairing attempt fails. With the low security modes/levels disabled, the evaluator shall initiate pairing from the TOE to a remote device that supports Security Mode 4/Level 3 or Security Mode 4/Level 4 (for BR/EDR) or Security Mode 1/Level 3 (for LE). The evaluator shall verify that this pairing is successful and uses the high security mode/level.

### 5.3.1 Additional SFRs

This PP-Module does not define any additional SFRs for any PP-Configuration where the MDF PP is claimed as the Base-PP.

## 5.4 GPOS PP Security Functional Requirements Direction

In a PP-Configuration that includes GPOS PP, the TOE is expected to rely on some of the security functions implemented by the Operating System as a whole and evaluated against the GPOS PP. The following sections describe any modifications that the ST author must make to the SFRs defined in the GPOS PP in addition to what is mandated by [Section 5.7 TOE Security Functional Requirements](#).

### 5.4.1 Modified SFRs

The SFRs listed in this section are defined in the GPOS PP and relevant to the secure operation of the TOE.

## 5.5 Security Audit (FAU)

### FAU\_GEN.1 Audit Data Generation

#### FAU\_GEN.1.1

In addition to the auditable events defined in the [GPOS PP], the OS shall generate audit records for the following audit events related to Bluetooth functionality:

Requirement	Auditable Events	Additional Audit Record Contents
FCS_CKM_EXT.8	None.	
FIA_BLT_EXT.1	Failed user authorization of Bluetooth device.	User authorization decision (e.g., user rejected connection, incorrect pin entry).
	Failed user authorization for local	Bluetooth address and name of device. Bluetooth profile. Identity of local service with <b>[selection: service ID,</b>

	Bluetooth Service.	<i>profile name</i> ].
FIA_BLT_EXT.2	Initiation of Bluetooth connection.	Bluetooth address and name of device.
	Failure of Bluetooth connection.	Reason for failure.
FIA_BLT_EXT.3 (optional)	Duplicate connection attempt.	BD_ADDR of connection attempt.
FIA_BLT_EXT.4	None.	
<a href="#">FIA_BLT_EXT.5</a> (if claimed)	None.	
FIA_BLT_EXT.6	None.	
FIA_BLT_EXT.7	None.	
FTP_BLT_EXT.1	None.	
FTP_BLT_EXT.2	None.	
FTP_BLT_EXT.3/BR	None.	
<a href="#">FTP_BLT_EXT.3/LE</a> (if claimed)	None.	

**Application Note:** It is not feasible for the FIA\_BLT\_EXT.3 event to be audited if the rejection is performed at the HCI layer because the Bluetooth standard does not provide a notification interface for this behavior in the HCI. This is why the event is labeled as optional. However, if the rejection is performed above the HCI layer, it is expected that a conformant TOE should implement this functionality.

## Evaluation Activities ▼

[FAU\\_GEN.1](#):

### Evaluation Activity ▼

#### TSS

*There are additional auditable events that serve to extend the [FAU\\_GEN.1](#) SFR found in the Base-PP.*

*This SFR is evaluated in the same manner as defined by the Evaluation Activities for the Base-PP. The only difference is that the evaluator shall also assess the auditable events required for this PP-Module in addition to those defined in the Base-PP.*

## 5.6 Security Management (FMT)

### FMT\_MOF\_EXT.1 Management of Security Functions Behavior

FMT\_MOF\_EXT.1.1

There is no change to the text of this SFR. The SFR references [FMT\\_SMF\\_EXT.1](#) and states that the OS shall permit the administrator role to perform the relevant functions listed in [FMT\\_SMF\\_EXT.1](#). The function "Enable/Disable the Bluetooth interface" is listed as an optional management function in [FMT\\_SMF\\_EXT.1](#) for both users and administrators. When this PP-Module is claimed, the administrator or user role must be able to enable/disable the Bluetooth interface. In other words, the function itself is moved from optional to mandatory, but this PP-Module does not require that it be implemented by a specific role. If the ST indicates that the administrator role can perform this function, then the restrictions imposed by [FMT\\_MOF\\_EXT.1](#) will apply to it.



FMT\_MOF\_EXT.1:

**Evaluation Activity** ▼**TSS**

*There is no change to the text of this SFR or its Evaluation Activities in this PP-Module. The "Enable/Disable the Bluetooth interface" function defined in [FMT\\_SMF\\_EXT.1.1](#) is mandatory for a TOE that claims conformance to this PP-Module. However, the PP-Module does not specify a role that must or must not be able to perform this function. The evaluator shall ensure that appropriate testing is performed on the administrative privileges required to perform this function based on the ST's description of what the TSF permits.*

**FMT\_SMF\_EXT.1 Specification of Management Functions**

FMT\_SMF\_EXT.1.1

This PP-Module prescribes the following changes to this SFR as defined in the Base-PP:

- The function "Enable/disable Bluetooth interface" must be implemented, though this PP-Module does not mandate whether it be assigned to the Administrator or User role.
- The following additional management functions are defined, and should be appended to the table in the Base-PP:

Function	Administrator	User
BT-1. Configure the Bluetooth trusted channel. <ul style="list-style-type: none"> <li>• Disable/enable the Discoverable (for BR/EDR) and Advertising (for LE) modes;</li> </ul>	X	O
BT-2. Change the Bluetooth device name (separately for BR/EDR and LE);	O	O
BT-3. Provide separate controls for turning the BR/EDR and LE radios on and off;	O	O
BT-4. Allow/disallow the following additional wireless technologies to be used with Bluetooth;	O	O
BT-5. Configure allowable methods of Out of Band pairing (for BR/EDR and LE);	O	O
BT-6. Disable/enable the Discoverable (for BR/EDR) and Advertising (for LE) modes separately;	O	O
BT-7. Disable/enable the Connectable mode (for BR/EDR and LE);	O	O
BT-8. Disable/enable the Bluetooth <b>[assignment: list of Bluetooth service and/or profiles available on the OS (for BR/EDR and LE)]</b> ;	O	O
BT-9. Specify minimum level of security for each pairing (for BR/EDR and LE);	O	O

**Application Note:** The ST should indicate which of the optional management functions are implemented in the TOE. This can be done by adjusting the "Administrator" and "User" columns to "X" according to which capabilities are present or not present, and for which privilege level.

(BT-1.) Management of the Discoverable and Advertising mode and management of the Bluetooth device name are mandatory. All other management functions for Bluetooth are currently objective.

(BT-2. optional) Requires management of the Bluetooth device name separately for BR/EDR and LE radios.

(BT-4. optional) May include disabling Wi-Fi being used as a part of Bluetooth High Speed and/or disabling NFC as an Out of Band pairing method for Bluetooth. May also include other wireless technologies beyond those already



specified.

(BT-8. optional) The Bluetooth services and/or profiles that may be disabled should be listed for the user or administrator either by service and/or profile name or by the types of applications for which the service and/or profile is used.

(BT-9. optional) The minimum level of security permitted may be configurable for each individual pairing or for all Bluetooth pairings.

- If the TSF supports any of the BR/EDR security modes in the following list; it should provide a mechanism for the user to choose the minimum level of security to enforce for a particular device during the pairing process: Security Mode 1 (any level); Security Mode 2; (any level); Security Mode 3; (any level); Security Mode 4; Levels 0;1;2 (aside from the services permitted to use Mode 4; Level 0 in Bluetooth Core Specification version 4.2; Vol. 3; Part C; p. 325).
- If the TSF supports any of the LE security modes in the following list; it should provide a mechanism for the user to choose the minimum level of security to enforce for a particular device during the pairing process: Security Mode 1: Levels 1, 2; Security Mode 2, (any level).

## Evaluation Activities ▼

### [FMT\\_SMF\\_EXT.1:](#)

#### Evaluation Activity ▼

##### **TSS**

*The evaluator shall ensure that the TSS includes a description of the Bluetooth profiles and services supported and the Bluetooth security modes and levels supported by the TOE.*

*If function BT-4, "Allow/disallow additional wireless technologies to be used with Bluetooth," is selected, the evaluator shall verify that the TSS describes any additional wireless technologies that may be used with Bluetooth, which may include Wi-Fi with Bluetooth High Speed and/or NFC as an Out of Band pairing mechanism.*

*If function BT-5, "Configure allowable methods of Out of Band pairing (for BR/EDR and LE)," is selected, the evaluator shall verify that the TSS describes when Out of Band pairing methods are allowed and which ones are configurable.*

*If function BT-8, "Disable/enable the Bluetooth services and/or profiles available on the OS (for BR/EDR and LE)," is selected, the evaluator shall verify that all supported Bluetooth services are listed in the TSS as manageable and, if the TOE allows disabling by application rather than by service name, that a list of services for each application is also listed.*

*If function BT-9, "Specify minimum level of security for each pairing (for BR/EDR and LE)," is selected, the evaluator shall verify that the TSS describes the method by which the level of security for pairings are managed, including whether the setting is performed for each pairing or is a global setting.*

##### **Guidance**

*The evaluator shall verify that the operational guidance describes the Out of Band pairing methods if selected. For the remaining functions, the evaluator shall ensure that they are discussed in the guidance to the same level of detail that the Base-PP requires for the management functions defined there.*

##### **Tests**

*The evaluator shall use a Bluetooth-specific protocol analyzer to perform the following tests:*

- **Test 1:** *The evaluator shall disable the Discoverable mode and shall verify that other Bluetooth BR/EDR devices cannot detect the TOE. The evaluator shall use the protocol analyzer to verify that the TOE does not respond to inquiries from other devices searching for Bluetooth devices. The evaluator shall enable Discoverable mode and verify that other devices can detect the TOE and that the TOE sends response packets to inquiries from searching devices.*

*The following tests are conditional on if the corresponding function is included in the ST:*

- **Test 2:** (conditional): *The evaluator shall examine Bluetooth traffic from the TOE to determine the current Bluetooth device name, change the Bluetooth device name, and verify that the Bluetooth traffic from the TOE lists the new name. The evaluator shall examine Bluetooth traffic from the TOE to determine the current Bluetooth device name for BR/EDR and LE. The evaluator shall change the Bluetooth device name for LE independently of the device name for BR/EDR. The evaluator shall verify that the Bluetooth traffic from the TOE lists the new name.*

- **Test 3:** (conditional): The evaluator shall disable Bluetooth BR/EDR and enable Bluetooth LE. The evaluator shall examine Bluetooth traffic from the TOE to confirm that only Bluetooth LE traffic is present. The evaluator shall repeat the test with Bluetooth BR/EDR enabled and Bluetooth LE disabled, confirming that only Bluetooth BR/EDR is present.
- **Test 4:** (conditional): For each additional wireless technology that can be used with Bluetooth as claimed in the ST, the evaluator shall revoke Bluetooth permissions from that technology. If the set of supported wireless technologies includes Wi-Fi, the evaluator shall verify that Bluetooth High Speed is not able to send Bluetooth traffic over Wi-Fi when disabled. If the set of supported wireless technologies includes NFC, the evaluator shall verify that NFC cannot be used for pairing when disabled. For any other supported wireless technology, the evaluator shall verify that it cannot be used with Bluetooth in the specified manner when disabled. The evaluator shall then re-enable all supported wireless technologies and verify that all functionality that was previously unavailable has been restored.
- **Test 5:** (conditional): The evaluator shall attempt to pair using each of the Out of Band pairing methods, verify that the pairing method works, iteratively disable each pairing method, and verify that the pairing method fails.
- **Test 6:** (conditional): The evaluator shall enable Advertising for Bluetooth LE, verify that the advertisements are captured by the protocol analyzer, disable Advertising, and verify that no advertisements from the device are captured by the protocol analyzer.
- **Test 7:** (conditional): The evaluator shall enable Connectable mode and verify that other Bluetooth devices may pair with the TOE and (if the devices were bonded) re-connect after pairing and disconnection. For BR/EDR devices: The evaluator shall use the protocol analyzer to verify that the TOE responds to pages from the other devices and permits pairing and re-connection. The evaluator shall disable Connectable mode and verify that the TOE does not respond to pages from remote Bluetooth devices, thereby not permitting pairing or re-connection. For LE: The evaluator shall use the protocol analyzer to verify that the TOE sends connectable advertising events and responds to connection requests. The evaluator shall disable Connectable mode and verify that the TOE stops sending connectable advertising events and stops responding to connection requests from remote Bluetooth devices.
- **Test 8:** (conditional): For each supported Bluetooth service and/or profile listed in the TSS, the evaluator shall verify that the service or profile is manageable. If this is configurable by application rather than by service and/or profile name, the evaluator shall verify that a list of service and/or profiles for each application is also listed.
- **Test 9:** (conditional): The evaluator shall allow low security modes/levels on the TOE and shall initiate pairing with the TOE from a remote device that allows only something other than Security Mode 4/Level 3 or Security Mode 4/Level 4 (for BR/EDR), or Security Mode 1/Level 3 (for LE). (For example, a remote BR/EDR device may claim Input/Output capability "NoInputNoOutput" and state that man-in-the-middle (MiTM) protection is not required. A remote LE device may not support encryption.) The evaluator shall verify that this pairing attempt succeeds due to the TOE falling back to the low security mode/level. The evaluator shall then remove the pairing of the two devices, prohibit the use of low security modes/levels on the TOE, then attempt the connection again. The evaluator shall verify that the pairing attempt fails. With the low security modes/levels disabled, the evaluator shall initiate pairing from the TOE to a remote device that supports Security Mode 4/Level 3 or Security Mode 4/Level 4 (for BR/EDR) or Security Mode 1/Level 3 (for LE). The evaluator shall verify that this pairing is successful and uses the high security mode/level.

### 5.6.1 Additional SFRs

This PP-Module does not define any additional SFRs for any PP-Configuration where the GPOS PP is claimed as the Base-PP.

## 5.7 TOE Security Functional Requirements

The following section describes the SFRs that must be satisfied by any TOE that claims conformance to this PP-Module. These SFRs must be claimed regardless of which PP-Configuration is used to define the TOE.

## 5.8 TOE Security Functional Requirements Rationale

The following rationale provides justification for each security objective for the TOE, showing that the SFRs are suitable to meet and achieve the security objectives:

**Table 2: SFR Rationale**

OBJECTIVE	ADDRESSED BY	RATIONALE
O.PLACEHOLDER	placeholder	placeholder

# 6 Consistency Rationale

## 6.1 Protection Profile for Mobile Device Fundamentals

### 6.1.1 Consistency of TOE Type

If this PP-Module is used to extend the MDF PP, the TOE type for the overall TOE is still a mobile device. However, one of the functions of the device must be the ability for it to have Bluetooth capability. The TOE boundary is simply extended to include that functionality.

### 6.1.2 Consistency of Security Problem Definition

The threats, assumptions, and OSPs defined by this PP-Module (see section 3.1) supplement those defined in the MDF PP as follows: The threats that apply to this PP-Module are inherited from the Base-PP to which the TOE also conforms. This PP-Module does not add or remove any elements to the security problem definition given in the MDF PP.

PP-Module Threat, Assumption, OSP	Consistency Rationale
-----------------------------------	-----------------------

T.PLACEHOLDER	placeholder
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P.PLACEHOLDER	
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### 6.1.3 Consistency of Objectives

The objectives that apply to this PP-Module are inherited from the Base-PP to which the TOE also conforms. This PP-Module does not add or remove any elements to the objectives given in the MDF PP. The objectives for the TOEs are consistent with the MDF PP based on the following rationale:

PP-Module TOE Objective	Consistency Rationale
-------------------------	-----------------------

O.PLACEHOLDER	
---------------	--

### 6.1.4 Consistency of Requirements

This PP-Module identifies several SFRs from the MDF PP that are needed to support Bluetooth functionality. This is considered to be consistent because the functionality provided by the MDF PP is being used for its intended purpose. The PP-Module also identifies a number of modified SFRs from the MDF PP that are used entirely to provide functionality for Bluetooth. The rationale for why this does not conflict with the claims defined by the MDF PP are as follows:

PP-Module Requirement	Consistency Rationale
Modified SFRs	
FAU_GEN.1	The ST author is instructed to add new auditable events for Bluetooth functionality; the SFR behavior itself is otherwise unmodified.
FMT_SMF_EXT.1	The ST author is instructed to complete an assignment in the SFR with information related to Bluetooth, and to include additional management functions in this SFR based on the Bluetooth capability defined by the PP-Module.
Mandatory SFRs	
FCS_CKM_EXT.8	This SFR applies to the frequency of key generation activity. This does not conflict with the Base-PP because it involves a key generation mechanism defined in the Base-PP and relates exclusively to Bluetooth functionality so it does not affect any other key generation activities required by the Base-PP.
FIA_BLT_EXT.1	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FIA_BLT_EXT.2	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FIA_BLT_EXT.3	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FIA_BLT_EXT.4	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FIA_BLT_EXT.6	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.

FIA_BLT_EXT.7	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FTP_BLT_EXT.1	This SFR applies to encryption of Bluetooth communications. This is a trusted channel that is not discussed in the Base-PP, but it relies on the same cryptographic algorithms specified in the Base-PP to function.
FTP_BLT_EXT.2	This SFR applies to encryption of Bluetooth communications. This is a trusted channel that is not discussed in the Base-PP, but it relies on the same cryptographic algorithms specified in the Base-PP to function.
FTP_BLT_EXT.3/BR	This SFR applies to encryption of Bluetooth communications. This is a trusted channel that is not discussed in the Base-PP, but it relies on the same cryptographic algorithms specified in the Base-PP to function.

## Optional SFRs

This PP-Module does not define any Optional requirements.

## Selection-based SFRs

FTP_BLT_EXT.3/LE	This SFR applies to encryption of Bluetooth communications. This is a trusted channel that is not discussed in the Base-PP, but it relies on the same cryptographic algorithms specified in the Base-PP to function.
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## Objective SFRs

FIA_BLT_EXT.5	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
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## Implementation-Dependent SFRs

This PP-Module does not define any Implementation-Dependent requirements.

## 6.2 Protection Profile for General Purpose Operating Systemss

### 6.2.1 Consistency of TOE Type

If this PP-Module is used to extend the [GPOS PP], the TOE type for the overall TOE is still a generic operating system. However, one of the functions of the generic operating system must be the ability for it to have Bluetooth capability. The TOE boundary is simply extended to include that functionality.

### 6.2.2 Consistency of Security Problem Definition

The threats, assumptions, and OSPs defined by this PP-Module (see section 3.1) supplement those defined in the GPOS PP as follows: The threats that apply to this PP-Module are inherited from the Base-PP to which the TOE also conforms. This PP-Module does not add or remove any elements to the security problem definition given in the GPOS PP.

PP-Module Threat, Assumption, OSP	Consistency Rationale
T.PLACEHOLDER	placeholder
P.PLACEHOLDER	

### 6.2.3 Consistency of Objectives

The objectives that apply to this PP-Module are inherited from the Base-PP to which the TOE also conforms. This PP-Module does not add or remove any elements to the objectives given in the GPOS PP. The objectives for the TOEs are consistent with the GPOS PP based on the following rationale:

PP-Module TOE Objective	Consistency Rationale
O.PLACEHOLDER	

#### 6.2.4 Consistency of Requirements

This PP-Module identifies several SFRs from the GPOS PP that are needed to support Bluetooth functionality. This is considered to be consistent because the functionality provided by the GPOS PP is being used for its intended purpose. The PP-Module also identifies a number of modified SFRs from the GPOS PP that are used entirely to provide functionality for Bluetooth. The rationale for why this does not conflict with the claims defined by the GPOS PP are as follows:

PP-Module Requirement	Consistency Rationale
1. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.
2. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.
3. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.
4. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.
5. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.
6. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.
7. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.
8. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.
9. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.
10. The PP-Module must be designed to ensure that the system can handle a minimum of 1000 concurrent users.	This requirement is consistent with the system's design goal of supporting a large number of concurrent users, as specified in the system requirements document.

### Modified SFRs

FAU_GEN.1	The ST author is instructed to add new auditable events for Bluetooth functionality; the SFR behavior itself is otherwise unmodified.
FMT_MOF_EXT.1	The ST author is required to associate all claimed management functions with the administrative privileges required to execute them. This PP-Module simply extends this requirement to apply to the management functions added and mandated by the PP-Module.
FMT_SMF_EXT.1	The ST author is required to include an optional management function defined in the Base-PP that relates to Bluetooth, and to include additional management functions in this SFR based on the Bluetooth capability defined by the PP-Module.

### Mandatory SFRs

FCS_CKM_EXT.8	This SFR applies to the frequency of key generation activity. This does not conflict with the Base-PP because it involves a key generation mechanism defined in the Base-PP and relates exclusively to Bluetooth functionality so it does not affect any other key generation activities required by the Base-PP.
FIA_BLT_EXT.1	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FIA_BLT_EXT.2	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FIA_BLT_EXT.3	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FIA_BLT_EXT.4	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FIA_BLT_EXT.6	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FIA_BLT_EXT.7	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
FTP_BLT_EXT.1	This SFR applies to encryption of Bluetooth communications. This is a trusted channel that is not discussed in the Base-PP, but it relies on the same cryptographic algorithms specified in the Base-PP to function.
FTP_BLT_EXT.2	This SFR applies to encryption of Bluetooth communications. This is a trusted channel that is not discussed in the Base-PP, but it relies on the same cryptographic algorithms specified in the Base-PP to function.
FTP_BLT_EXT.3/BR	This SFR applies to encryption of Bluetooth communications. This is a trusted channel that is not discussed in the Base-PP, but it relies on the same cryptographic algorithms specified in the Base-PP to function.

### Optional SFRs

This PP-Module does not define any Optional requirements.

### Selection-based SFRs

FTP_BLT_EXT.3/LE	This SFR applies to encryption of Bluetooth communications. This is a trusted channel that is not discussed in the Base-PP, but it relies on the same cryptographic algorithms specified in the Base-PP to function.
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### Objective SFRs

FIA_BLT_EXT.5	This SFR applies to the establishment of Bluetooth connectivity, which is behavior not described in or prevented by the Base-PP.
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### Implementation-Dependent SFRs

This PP-Module does not define any Implementation-Dependent requirements.

# Appendix A - Optional SFRs

## A.1 Strictly Optional Requirements

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This PP-Module does not define any Optional SFRs.

## A.2 Objective Requirements

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### FIA\_BLT\_EXT.5 Bluetooth Secure Connections

FIA\_BLT\_EXT.5.1

The TOE shall support Secure Connections Only mode for Bluetooth BR/EDR and [**selection:** *Bluetooth LE, no other Bluetooth protocol*].

**Application Note:** The specification states that Secure Connections Only Mode, also called "FIPS Mode," should be used when security is more important than backwards compatibility. From the specification, "The Host will enforce that the P-256 elliptic curve is used during pairing; the secure authentication sequences are used; and AES-CCM is used for encryption." Also, "if a BR/EDR/LE device is configured in Secure Connections Only Mode, then a transport will only be used when Secure Connections is supported by both devices."

### Evaluation Activities ▼

*FIA\_BLT\_EXT.5:*

#### Evaluation Activity ▼

**TSS**

*The evaluator shall ensure that the TSS describes support for Secure Connections Only mode for BR/EDR and, if supported, Bluetooth LE.*

**Guidance**

*The evaluator shall ensure that the guidance includes instructions on how to place the TOE into Secure Connections Only mode for BR/EDR and, if supported, Bluetooth LE.*

**Tests**

*The evaluator shall perform the following tests, once for BR/EDR and once for LE (if applicable):*

- **Test 1:** *The evaluator shall place the TOE into Secure Connections Only mode. The evaluator shall then attempt a pairing to a remote device that does not support Secure Connections Only mode and verify that the attempt fails.*
- **Test 2:** *The evaluator shall place the TOE into Secure Connections Only mode. The evaluator shall attempt a pairing to a remote device that supports Secure Connections Only mode and has it enabled. The evaluator shall verify that the pairing attempt succeeds. The evaluator shall also use a Bluetooth packet sniffer to verify that the parameters of the pairing and encryption are consistent with Secure Connections.*

## A.3 Implementation-Dependent Requirements

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This PP-Module does not define any Implementation-Dependent SFRs.



# Appendix B - Selection-based SFRs

## FTP\_BLT\_EXT.3/LE Bluetooth Encryption Parameters (LE)

FTP\_BLT\_EXT.3.1/LE

The TSF shall set the minimum encryption key size to [**assignment:** *key size larger than or equal to 128 bits*] for [LE] and not negotiate encryption key sizes smaller than the minimum size.

**Application Note:** To conform to this PP-Module, the TOE must implement encryption for Bluetooth BR/EDR as required by FTP\_BLT\_EXT.1.1. A conformant TOE does not need to support Bluetooth LE; however, if it does, then it must also support encryption for it. [FTP\\_BLT\\_EXT.3/LE](#) must therefore be claimed if 'LE' is selected in FTP\_BLT\_EXT.1.1.

### Evaluation Activities ▼

[FTP\\_BLT\\_EXT.3/LE:](#)

#### Evaluation Activity ▼

##### **TSS**

*The evaluator shall examine the TSS and verify that it specifies the minimum key size for LE encryption, whether this value is configurable, and the mechanism by which the TOE will not negotiate keys sizes smaller than the minimum.*

##### **Guidance**

*The evaluator shall verify that the guidance includes instructions on how to configure the minimum encryption key size for LE encryption, if configurable.*

##### **Tests**

*The evaluator shall perform the following tests:*

- **Test 1:** *The evaluator shall perform the following steps using a Bluetooth protocol analyzer to observe packets pertaining to the encryption key size:*

*Step 1: Initiate LE pairing with the TOE from a remote Bluetooth device that has been configured to have a minimum encryption key size that is equal to or greater than that of the TOE. This can be done using certain commercially-available tools that can send the appropriate command to certain commercially-available Bluetooth controllers.*

*Step 2: Use a Bluetooth packet sniffer to verify that the encryption key size negotiated for the connection is at least as large as the minimum encryption key size defined for the TOE.*

- **Test 2:** *(conditional): If the encryption key size is configurable, configure the TOE to support a different minimum key size, then repeat Test 1 and verify that the negotiated key size is at least as large as the new minimum value.*
- **Test 3:** *The evaluator shall perform the following steps using a Bluetooth protocol analyzer to observe packets pertaining to the encryption key size:*

*Step 1: Initiate LE pairing with the TOE from a remote Bluetooth device that has been configured to have a maximum encryption key size of 1 byte. This can be done using certain commercially-available tools that can send the appropriate command to certain commercially-available Bluetooth controllers.*

*Step 2: Verify that the encryption key size suggested by the remote device is not accepted by the TOE and that the connection is not completed.*



# Appendix C - Extended Component Definitions

This appendix contains the definitions for all extended requirements specified in the PP-Module.

## C.1 Extended Components Table

All extended components specified in the PP are listed in this table:

**Table 3: Extended Component Definitions**  
**Functional Class    Functional Components**

--

## C.2 Extended Component Definitions

### FCS\_CKM\_EXT Cryptographic Key Management

#### Family Behavior

Components in this family define requirements for cryptographic key management beyond those which are specified in the Part 2 family FCS\_CKM.



#### Component Leveling

FCS\_CKM\_EXT.8, Bluetooth Key Generation, requires the TSF to generate key pairs used for Bluetooth over a specified time period or in response to some observed event.

#### Management: FCS\_CKM\_EXT.8

No specific management functions are identified.

#### Audit: FCS\_CKM\_EXT.8

There are no auditable events foreseen.

#### FCS\_CKM\_EXT.8 Bluetooth Key Generation

Hierarchical to: No other components.

Dependencies to: FCS\_CKM.1 Cryptographic Key Generation

FPT\_STM.1 Reliable Time Stamps

FTP\_BLT\_EXT.1 Bluetooth Encryption

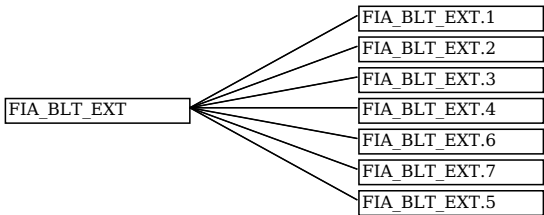
#### FCS\_CKM\_EXT.8.1

The TSF shall generate public/private ECDH key pairs every [assignment: frequency of and/or criteria for new key pair generation].

### FIA\_BLT\_EXT Bluetooth Pairing

#### Family Behavior

Components in this family define Bluetooth-specific identification and authentication requirements.



#### Component Leveling

FIA\_BLT\_EXT.1, Bluetooth User Authorization, requires the TSF to have explicit user authorization before allowing a Bluetooth pairing.

#### Management: FIA\_BLT\_EXT.1

No specific management functions are identified.

#### Audit: FIA\_BLT\_EXT.1

The following actions should be auditable if FAU\_GEN Security audit data generation is included in the PP/ST:

- Failed user authorization of Bluetooth device.
- Failed user authorization for local Bluetooth device.

## **FIA\_BLT\_EXT.1 Bluetooth User Authorization**

Hierarchical to: No other components.

Dependencies to: No dependencies.

### **FIA\_BLT\_EXT.1.1**

The TSF shall require explicit user authorization before pairing with a remote Bluetooth device.

### **Component Leveling**

FIA\_BLT\_EXT.2, Bluetooth Mutual Authentication, requires the TSF to enforce mutual authentication for Bluetooth.

### **Management: FIA\_BLT\_EXT.2**

No specific management functions are identified.

### **Audit: FIA\_BLT\_EXT.2**

The following actions should be auditable if FAU\_GEN Security audit data generation is included in the PP/ST:

- Initiation of Bluetooth connection.
- Failure of Bluetooth connection.

## **FIA\_BLT\_EXT.2 Bluetooth Mutual Authentication**

Hierarchical to: No other components.

Dependencies to: FIA\_BLT\_EXT.1 Bluetooth User Authorization

### **FIA\_BLT\_EXT.2.1**

The TSF shall require Bluetooth mutual authentication between devices prior to any data transfer over the Bluetooth link.

### **Component Leveling**

FIA\_BLT\_EXT.3, Rejection of Duplicate Bluetooth Connections, requires the TSF to reject duplicate attempts to connect to Bluetooth.

### **Management: FIA\_BLT\_EXT.3**

No specific management functions are identified.

### **Audit: FIA\_BLT\_EXT.3**

The following actions should be auditable if FAU\_GEN Security audit data generation is included in the PP/ST:

- Duplicate connection attempt.

## **FIA\_BLT\_EXT.3 Rejection of Duplicate Bluetooth Connections**

Hierarchical to: No other components.

Dependencies to: FIA\_BLT\_EXT.1 Bluetooth User Authorization

### **FIA\_BLT\_EXT.3.1**

The TSF shall discard pairing and session initialization attempts from a Bluetooth device address (BD\_ADDR) to which an active session already exists.

### **Component Leveling**

FIA\_BLT\_EXT.4, Secure Simple Pairing, requires the TSF to support Secure Simple Pairing.

### **Management: FIA\_BLT\_EXT.4**

No specific management functions are identified.

### **Audit: FIA\_BLT\_EXT.4**

There are no auditable events foreseen.

## **FIA\_BLT\_EXT.4 Secure Simple Pairing**

Hierarchical to: No other components.

Dependencies to: FIA\_BLT\_EXT.1 Bluetooth User Authorization

### **FIA\_BLT\_EXT.4.1**

The TOE shall support Bluetooth Secure Simple Pairing, both in the host and the controller.

## **FIA\_BLT\_EXT.4.2**

The TOE shall support Secure Simple Pairing during the pairing process.

### **Component Leveling**

FIA\_BLT\_EXT.6, Trusted Bluetooth Device User Authorization, requires the TSF to have explicit user authentication before associating trusted services with Bluetooth.

### **Management: FIA\_BLT\_EXT.6**

The following actions could be considered for the management functions in FMT:

- Ability to specify the services that require explicit user authorization before trusted devices can use them.

### **Audit: FIA\_BLT\_EXT.6**

There are no auditable events foreseen.

## **FIA\_BLT\_EXT.6 Trusted Bluetooth Device User Authorization**

Hierarchical to: No other components.

Dependencies to: FIA\_BLT\_EXT.1 Bluetooth User Authorization

### **FIA\_BLT\_EXT.6.1**

The TSF shall require explicit user authorization before granting trusted remote devices access to services associated with the following Bluetooth profiles: [**assignment:** *list of Bluetooth profiles*].

### **Component Leveling**

FIA\_BLT\_EXT.7, Untrusted Bluetooth Device User Authorization, requires the TSF to have explicit user authentication before associating untrusted services with Bluetooth.

### **Management: FIA\_BLT\_EXT.7**

The following actions could be considered for the management functions in FMT:

- Ability to specify the services that require explicit user authorization before untrusted devices can use them.

### **Audit: FIA\_BLT\_EXT.7**

There are no auditable events foreseen.

## **FIA\_BLT\_EXT.7 Untrusted Bluetooth Device User Authorization**

Hierarchical to: No other components.

Dependencies to: FIA\_BLT\_EXT.1 Bluetooth User Authorization

### **FIA\_BLT\_EXT.7.1**

The TSF shall require explicit user authorization before granting untrusted remote devices access to services associated with the following Bluetooth profiles: [**assignment:** *list of Bluetooth profiles*].

### **Component Leveling**

[FIA\\_BLT\\_EXT.5](#), Bluetooth Secure Connections, requires the TSF to support Secure Connections Only mode.

### **Management: FIA\_BLT\_EXT.5**

No specific management functions are identified.

### **Audit: FIA\_BLT\_EXT.5**

There are no auditable events foreseen.

## **FIA\_BLT\_EXT.5 Bluetooth Secure Connections**

Hierarchical to: No other components.

Dependencies to: FIA\_BLT\_EXT.1 Bluetooth User Authorization

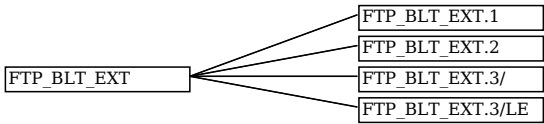
### **FIA\_BLT\_EXT.5.1**

The TOE shall support Secure Connections Only mode for Bluetooth BR/EDR and [**selection:** *Bluetooth LE, no other Bluetooth protocol*].

# FTP\_BLT\_EXT Bluetooth Trusted Communications

## Family Behavior

Components in this family define requirements for Bluetooth encryption.



## Component Leveling

FTP\_BLT\_EXT.1, Bluetooth Encryption, requires the TSF to enforce encryption when transmitting over Bluetooth.

### Management: FTP\_BLT\_EXT.1

No specific management functions are identified.

### Audit: FTP\_BLT\_EXT.1

There are no auditable events foreseen.

### FTP\_BLT\_EXT.1 Bluetooth Encryption

Hierarchical to: No other components.

Dependencies to: FCS\_CKM\_EXT.8 Bluetooth Key Generation

FIA\_BLT\_EXT.1 Bluetooth User Authorization

#### FTP\_BLT\_EXT.1.1

The TSF shall enforce the use of encryption when transmitting data over the Bluetooth trusted channel for BR/EDR and [**selection:** *LE, no other connections*].

#### FTP\_BLT\_EXT.1.2

The TSF shall use key pairs per FCS\_CKM\_EXT.8 for Bluetooth encryption.

## Component Leveling

FTP\_BLT\_EXT.2, Persistence of Bluetooth Encryption, requires the TSF to ensure encryption for the duration of the use of the Bluetooth channel.

### Management: FTP\_BLT\_EXT.2

No specific management functions are identified.

### Audit: FTP\_BLT\_EXT.2

There are no auditable events foreseen.

### FTP\_BLT\_EXT.2 Persistence of Bluetooth Encryption

Hierarchical to: No other components.

Dependencies to: FTP\_BLT\_EXT.1 Bluetooth Encryption

#### FTP\_BLT\_EXT.2.1

The TSF shall [**selection:** *restart encryption, terminate the connection*] if the remote device stops encryption while connected to the TOE.

## Component Leveling

FTP\_BLT\_EXT.3/BR, Bluetooth Encryption Parameters (BR/EDR), specifies the key sizes used for Bluetooth.

### Management: FTP\_BLT\_EXT.3/BR

The following actions could be considered for the management functions in FMT:

- Specification of minimum encryption key size.

### Audit: FTP\_BLT\_EXT.3/BR

There are no auditable events foreseen.

### FTP\_BLT\_EXT.3/BR Bluetooth Encryption Parameters (BR/EDR)

Hierarchical to: No other components.

Dependencies to: FTP\_BLT\_EXT.1 Bluetooth Encryption

## **FTP\_BLT\_EXT.3.1/BR**

The TSF shall set the minimum encryption key size to [**assignment:** *key size larger than or equal to 128 bits*] for [**assignment:** *Bluetooth protocol*].

### **Component Leveling**

[FTP\\_BLT\\_EXT.3/LE](#), Bluetooth Encryption Parameters (LE),

### **Management: FTP\_BLT\_EXT.3/LE**

There are no management functions foreseen.

### **Audit: FTP\_BLT\_EXT.3/LE**

There are no audit events foreseen.

### **FTP\_BLT\_EXT.3/LE Bluetooth Encryption Parameters (LE)**

Hierarchical to: No other components.

Dependencies to: No dependencies.

## **FTP\_BLT\_EXT.3.1/LE**

The TSF shall set the minimum encryption key size to [**assignment:** *key size larger than or equal to 128 bits*] for [*LE*] and not negotiate encryption key sizes smaller than the minimum size.

# Appendix D - Implicitly Satisfied Requirements

This appendix lists requirements that should be considered satisfied by products successfully evaluated against this PP-Module. However, these requirements are not featured explicitly as SFRs and should not be included in the ST. They are not included as standalone SFRs because it would increase the time, cost, and complexity of evaluation. This approach is permitted by [CC] Part 1, 8.2 Dependencies between components.

This information benefits systems engineering activities which call for inclusion of particular security controls. Evaluation against the PP-Module provides evidence that these controls are present and have been evaluated.

Requirement	Rationale for Satisfaction
FCS_CKM.1 - Cryptographic Key Generation	FCS_CKM_EXT.8 has a dependency on FCS_CKM.1 for the generation of ECDH key pairs. This dependency is implicitly satisfied in this PP-Module because both Base-PPs the PP-Module is intended to extend define this SFR and specify ECDH key generation as a required capability of the TOE. Therefore, a conformant TOE will always have this capability.
FPT_STM.1 - Reliable Time Stamps	FCS_CKM_EXT.8 has a dependency on FPT_STM.1 because key generation may be triggered by a given time period elapsing. When the TOE claims conformance to <a href="#">[MDF]</a> , this dependency is satisfied explicitly through the Base-PP's definition of FPT_STM.1. When the TOE claims conformance to <a href="#">[GPOS]</a> , this dependency is satisfied implicitly through that PP's A.PLATFORM assumption of a trustworthy computing platform, which can be reasonably assumed to include a hardware real-time clock.

# Appendix E - Entropy Documentation and Assessment

The TOE does not require any additional supplementary information to describe its entropy sources beyond the requirements outlined in the Base-PPs.

# Appendix F - Bibliography

Identifier	Title
[Bluetooth]	<a href="#">Bluetooth Core Specifications, version 5.2; December 2019,</a>
[CC]	Common Criteria for Information Technology Security Evaluation - <ul style="list-style-type: none"><li>• <a href="#">Part 1: Introduction and General Model</a>, CCMB-2017-04-001, Version 3.1 Revision 5, April 2017.</li><li>• <a href="#">Part 2: Security Functional Components</a>, CCMB-2017-04-002, Version 3.1 Revision 5, April 2017.</li><li>• <a href="#">Part 3: Security Assurance Components</a>, CCMB-2017-04-003, Version 3.1 Revision 5, April 2017.</li></ul>
[CEM]	<a href="#">Common Evaluation Methodology for Information Technology Security - Evaluation Methodology</a> , CCMB-2017-04-004, Version 3.1, Revision 5, April 2017.
[GPOS]	<a href="#">Protection Profile for General Purpose Operating Systems, Version 4.2.1</a> , April 22, 2019
[MDF]	<a href="#">Protection Profile for Mobile Device Fundamentals, Version 3.1</a> , June 16, 2017



# Appendix G - Acronyms

Acronym	Meaning
AES	Advanced Encryption Standard
AES-CCM	AES Counter with CBC-MAC Mode
API	Application Programming Interface
BR	Basic Rate
Base-PP	Base Protection Profile
CC	Common Criteria
CEM	Common Evaluation Methodology
ECDH	Elliptic Curve Diffie-Hellman
EDR	Enhanced Data Rate
FTP	File Transfer Protocol
HCI	Host Controller Interface
L2CAP	Logical Link Control and Adaptation Protocol
LE	Low Energy
LMP	Link Manager Protocol
MDF	Mobile Device Fundamentals
OBEX	Object Exchange
OE	Operational Environment
PP	Protection Profile
PP-Configuration	Protection Profile Configuration
PP-Module	Protection Profile Module
SAR	Security Assurance Requirement
SFR	Security Functional Requirement
ST	Security Target
TOE	Target of Evaluation
TSF	TOE Security Functionality
TSFI	TSF Interface
TSS	TOE Summary Specification