Homeland Security
Science and Technology

Office for Interoperability and Compatibility

Project 25 Compliance Assessment Bulletin

Project 25 Compliance Assessment Program

Minimum Feature Requirements

P25-CAB-MIN-FEATURE_REQ

November 2017

Notice of Disclaimer and Limitation of Liability

The Project 25 Compliance Assessment Program (P25 CAP) provides equipment purchasers with demonstrated evidence of a product's compliance with a select group of requirements within the suite of P25 standards. The test procedures used to validate these requirements are also part of the P25 suite of standards. Although successful tests will demonstrate P25 compliance for the specific requirements tested, the conclusions drawn from these tests do not apply to every environment or individual user's needs. P25 CAP-mandated tests only demonstrate product compliance with the test procedures listed in the Supplier's Declaration of Compliance and, therefore, only attest to a product's compliance with specific requirements within the P25 Standard.

Revision History

Version	Date	Description
Draft 3	9/16/2016	Original
Draft 5	9/27/2016	updates
Draft 6	10/04/2016	Add non-P25 Standard section
Draft 7	03/15/2017	Update based on comments received by the P25 CAP AP members
Draft 8	07/21/2017	Draft release for public comment
Draft 8	08/30/2017	Update based on public comments
V1.0	11/13/2017	Final version integrating public comments

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1   Introduction

The Department of Homeland Security (DHS) Science and Technology Directorate Office for Interoperability and Compatibility (OIC) Project 25 Compliance Assessment Program (P25 CAP) is a voluntary program that allows P25 equipment suppliers to formally demonstrate their products' compliance with a select group of requirements within the suite of P25 standards.

1.1   Scope

SAFECOM grant guidance[1] states that agencies using grant funds to purchase P25 equipment are strongly encouraged to obtain the P25 CAP SDOC and STR documents as verification that the equipment to be purchased falls within accordance with P25 CAP. Equipment with published SDOC and STR documents on the P25 CAP Approved (Grant Eligible) Equipment page of the P25 CAP website shall be considered P25 CAP Compliant.

In this CAB, the P25 CAP Advisory Panel (AP) defines the minimum interoperability features and capabilities that are required for P25 subscriber and repeater equipment that are capable of conventional operation to be eligible to be considered P25 CAP Compliant. This document defines which TIA-102/P25 CAP conventional interoperability test cases shall be passed in order for the equipment to be eligible to be considered P25 CAP Compliant and for the equipment's SDOC and STR to be eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment page of the P25 CAP website. The required conventional interoperability test cases are part of the 2016 P25 CAB for CAI testing document. This document, *Baseline Common Air Interface Testing Requirements (August 2016)[2],* is posted to the P25 CAP website.

Successful P25 CAP test case outcomes for the required minimum features shall be indicated in the P25 CAP SDOC and STR documents that are submitted to DHS OIC. Once the SDOC and STR are approved, they would be posted to the P25 CAP "Approved (Grant-Eligible) Equipment" list. SDOCs and STRs indicating failed or unsupported P25 CAP test case outcomes for the required minimum features and capabilities are not eligible for consideration as P25 CAP Compliant equipment nor eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment web page. P25 CAP 'rule of three' testing is required for these minimum features and capabilities.

Test cases are called out for subscribers testing separately from base station/repeaters testing.

1.2   Effective Date

This Compliance Assessment Bulletin becomes effective on <u>November 13, 2017.</u>

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[1] See 2017 SAFECOM Grant Guidance on Emergency Communications, Land Mobile Radio, pages 42-45. https://www.dhs.gov/publication/funding-documents
[2] See https://www.dhs.gov/publication/p25-cap-testing-documents

1.3   Normative References

TIA-102.BAAD-B Project 25 Conventional Procedures (2015)

TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems (2010)

P25-CAB-CAI_TEST_REQ Project 25 - Compliance Assessment Program – Baseline Common Air Interface Testing Requirements (August 2016)

1.4   Informative References

None

2   Subscriber P25 CAP Minimum Feature Requirements

In order for subscriber equipment to be eligible to be considered P25 CAP Compliant and for the equipment's SDOC and STR to be eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment web page, P25 CAP minimum feature requirements shall be verified for all subscribers capable of conventional operation. Feature requirements are verified with successful outcomes of the conventional interoperability test cases that appear under each feature section in this document. Successful P25 CAP test case outcomes shall be indicated in the P25 CAP SDOC and STR documents that are submitted to DHS OIC. Once the SDOC and STR are approved, they would be posted to the P25 CAP "Approved (Grant-Eligible) Equipment" list. SDOCs and STRs that indicate failed or unsupported P25 CAP test case outcomes for the required conventional interoperability features and capabilities listed in this section are not P25 CAP Compliant nor eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment web page.

2.1   Subscriber Group Call

2.1.1   Feature Overview

This features provides voice calls from one user to many users receiving the same call.

2.1.2   P25 CAP Feature Requirement Description

A subscriber unit shall be capable of initiating and receiving conventional group calls.

2.1.3   TIA Conformance

The TIA-102.BAAD-B Conventional Procedures document describes the feature in detail. The TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems document describes the test cases. TIA-102.CABA also provides a traceability table[3] between the test cases and conventional procedures defined in TA-102.BAAD-B.

TIA 102.BAAD-B Conventional Procedures

- Section 6.1 describes the group call functionality on a conventional system.

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[3] See TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems (2010), Table 8, page 14

TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems

- Section 2.2.2 TEST SUITE: Matching NAC Operation & SU Routine Group Voice Call Mode (Direct)

    o Section 2.2.2.4.1 Test case 1 – Routine group voice call

- Section 2.4.2. TEST SUITE: Matching NAC operation & SU Routine Group Call Mode (Repeated)

    o Section 2.4.2.4.1 Test case 1 – Matching NAC - SU routine group call

2.1.4 P25 CAP Test Cases

P25 CAP test cases from the *P25-CAB-CAI_TEST_REQ* document are listed below. These test cases are based on the TIA-102 test case shown above. These P25 CAP test cases shall be passed for the SDOC and STR of conventional capable equipment to be eligible to be considered P25 CAP Compliant and eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment web page.

- All test cases under '2.2.2 Routine Group Voice Call' (Direct)

- All test cases under '2.4.2 Routine Group Voice Call' (Repeated)

2.2 Subscriber Squelch Modes

2.2.1 Feature Overview

"Monitor Squelch" enables the receiver to unmute on any recognizable voice signal. "Normal Squelch" enables the receiver to unmute on any voice signal that has the correct network access code (NAC).

2.2.2 P25 CAP Feature Requirement Description

Subscriber units shall support monitor and normal squelch in conventional system operation.

2.2.3 TIA Conformance

The TIA-102.BAAD-B Conventional Procedures document describes this feature in detail. The TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems document describes the test cases. TIA-102.CABA also provides a traceability table[3] between the test cases in TIA-102.CABA and conventional procedures defined in TA-102.BAAD-B.

TIA 102.BAAD-B Conventional Procedures

- Section 6.1 describes the squelch modes.

TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems;

- Section 2.2.1 TEST SUITE: Matching NAC Operation and SU unaddressed voice call Mode (Direct – Normal Squelch)

    o Section 2.2.1.4.1 Test case 1 – Unaddressed voice call

- Section 2.2.3 TEST SUITE: Monitor Mode – SU Group Voice Call (Direct – Monitor Squelch)

    o Section 2.2.3.4.1 Test case 1 – Monitor Mode – Receiving group call

- Section 2.4.1 TEST SUITE: Matching NAC operation and SU unaddressed voice call mode (Repeated – Normal squelch)

    o Section 2.4.1.4.1 Test case 1 – Matching NAC operation – Unaddressed call mode

- Section 2.4.9 TEST SUITE: Monitor Mode – SU Group Voice Call (Repeated – Monitor squelch)

    o Section 2.4.9.4.1 Test case 1 – Monitor Mode – Receiving group call

2.2.4 P25 CAP Test Cases

P25 CAP tests case from the *P25-CAB-CAI_TEST_REQ* document are listed below. These test cases are based on the TIA-102 test case shown above. These P25 CAP test cases shall be passed for the SDOC and STR of conventional capable equipment to be eligible to be considered P25 CAP Compliant and eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment web page.

- All test cases under '2.2.1 - Normal Mode – SU Unaddressed Voice Call' (Direct)

- All test cases under '2.2.3 - Monitor Mode – SU Group Voice Call' (Direct)

- All test cases under '2.4.1 - Normal Mode – SU Unaddressed Voice Call' (Repeated)

- All test cases under '2.4.9 - Monitor Mode – SU Group Voice Call' (Repeated)

2.3 Subscriber Network Access Code (NAC)

2.3.1 Feature Overview

The NAC provides an RF channel addressing scheme to enable desired receiver traffic, block undesired receiver traffic and provide repeater addressing to control overlapping coverage.

2.3.2 P25 CAP Feature Requirement Description

A subscriber unit shall properly implement the conventional NACs $293 and $F7E.

2.3.3 TIA Conformance

The TIA-102.BAAD-B Conventional Procedures document describes the feature in detail. The TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems document describes the test cases. TIA-102.CABA also provides a traceability table[3] between the test cases in TIA-102.CABA and conventional procedures defined in TA-102.BAAD-B.

TIA-102.BAAD-B Conventional Procedures

- Section 6.1 describes NAC functionality.

TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems;

- Section 2.2.1 TEST SUITE: Matching NAC Operation and SU unaddressed voice call (Direct)

    o Section 2.2.1.4.1 Matching NAC Operation and SU unaddressed voice call (Direct)

- Section 2.2.8 TEST SUITE: Accept Any NAC in Normal and Selective Squelch Mode – SU Group Voice Call (Direct)

o Section 2.2.8.4.1 Accept Any NAC in Normal and Selective Squelch Mode – SU Group
Voice Call (Direct)

2.3.4 P25 CAP Test Cases

P25 CAP test cases from the *P25-CAB-CAI_TEST_REQ* document are listed below. These test cases are
based on the TIA-102 test case shown above. These P25 CAP test cases shall be passed for the SDOC and
STR of conventional capable equipment to be eligible to be considered P25 CAP Compliant and eligible
for posting on the P25 CAP Approved (Grant Eligible) Equipment web page.

- All test cases under '2.2.1 Matching NAC Operation and SU Unaddressed Voice Call' (Direct
Mode $293)

- All test cases under '2.2.8 Routine Group Voice Call' (Conventional Receive NAC $F7E)

3 Base Station/Repeater P25 CAP Minimum Feature Requirements

In order for base station/repeater equipment to be eligible to be considered P25 CAP Compliant and for
the equipment's SDOC and STR to be eligible for posting on the P25 CAP Approved (Grant Eligible)
Equipment web page, P25 CAP minimum feature requirements shall be verified for all base
station/repeater equipment capable of conventional operation. Feature requirements are verified with
successful outcomes of the conventional interoperability test cases that appear under each feature
section in this document. Successful P25 CAP/TIA-102 test case outcomes shall be indicated in the P25
CAP SDOC and STR documents that are submitted to DHS OIC. Once the SDOC and STR are approved,
they would be posted to the P25 CAP "Approved (Grant-Eligible) Equipment" list. SDOCs and STRs that
indicate failed or unsupported P25 CAP test case outcomes for the required conventional
interoperability features and capabilities listed in this section are not P25 CAP Compliant nor eligible for
posting on the P25 CAP Approved (Grant Eligible) Equipment web page.

3.1 Repeater NAC

3.1.1 Feature Overview

The repeater NAC provides an RF channel addressing scheme to enable desired receiver traffic, block
undesired receiver traffic and provide repeater addressing to control overlapping coverage.

3.1.2 P25 CAP Feature Requirement Description

A fixed conventional repeater shall be capable of supporting the following NAC values: $F7F and $F7E.

3.1.3 TIA Conformance

The TIA-102.BAAD-B Conventional Procedures document describes the feature in detail. The TIA-
102.CABA Interoperability Testing for Voice Operation in Conventional Systems document describes the
test cases. TIA-102.CABA also provides a traceability table[3] between the test cases in TIA-102.CABA and
conventional procedures defined in TA-102.BAAD-B.

TIA 102.BAAD-B Conventional Procedures

- Section 6.1 and section 6.4 describe NAC functionality for $293 and $F7F codes.

TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems.

- Section 2.4.5 TEST SUITE: Any NAC ($F7F) operation – SU unaddressed voice call

  - Section 2.4.5.4.1 Test case 1 – NAC $F7F operation – SU unaddressed voice call

- Section 2.4.6 TEST SUITE: Any NAC ($F7F) operation – SU routine group call

  - Section 2.4.6.4.1 Test case 1 – NAC $F7F operation – SU routine group voice call

- Section 2.4.7 TEST SUITE: Any NAC ($F7E) Operation with Fixed Transmit NAC – SU Group Voice Call

  - Section 2.4.7.4.1 Test case 1 – NAC $F7E operation – SU group voice call

3.1.4 P25 CAP Test Cases

P25 CAP test cases from the *P25-CAB-CAI_TEST_REQ* document are listed below. These test cases are based on the TIA-102 test case shown above. These P25 CAP test cases shall be passed for the SDOC and STR of conventional capable equipment to be eligible to be considered P25 CAP Compliant and eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment web page.

- All test cases under '2.4.5 Any NAC ($F7F) Operation – SU Unaddressed Voice Call' (Conventional REPEAT)

- All test cases under '2.4.6 Any NAC ($F7F) Operation – SU Routine Group Call' (Conventional REPEAT)

- All test cases under '2.4.7 Any NAC ($F7F) Operation with Fixed Transmit NAC – SU Group Call' (Conventional REPEAT)

3.2   Repeater NAC Operation - TX NAC = RX NAC

3.2.1 Feature Overview

This feature allows voice messages to be repeated with the same NAC as the received NAC.

3.2.2 P25 CAP Feature Requirement Description

A repeater shall be capable of transmitting the NAC that matches the NAC received from the subscriber for different call types.

3.2.3 TIA Conformance

The TIA-102.BAAD-B Conventional Procedures document describes the feature in detail. The TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems document describes the test cases that shall be passed. TIA-102.CABA also provides a traceability table[3] between the test cases in TIA-102.CABA and conventional procedures defined in TA-102.BAAD-B.

TIA 102.BAAD-B Conventional Procedures

- Section 6.1 and section 6.4 describe $F7F NAC functionality.

TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems;

- Section 2.4.1 TEST SUITE: Matching NAC operation and SU unaddressed Voice Call

    o Section 2.4.1.4.1 Test case 1 – Matching NAC operation – Unaddressed call mode

- Section 2.4.2 TEST SUITE: Matching NAC – SU Routine Group Call Mode

    o Section 2.4.2.4.1 Test case 1 - Matching NAC - SU routine group call

3.2.4 P25 CAP Test Cases

P25 CAP test cases from the *P25-CAB-CAI_TEST_REQ* document are listed below. These test cases are based on the TIA-102 test case shown above. These P25 CAP test cases shall be passed for the SDOC and STR of conventional capable equipment to be eligible to be considered P25 CAP Compliant and eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment web page.

- All test cases under '2.4.1 Matching NAC Operation and SU Unaddressed Voice Call' (Conventional REPEAT)

- All test cases under '2.4.2 Matching NAC Operation – SU Routine Group Call Mode' (Conventional REPEAT)

3.3 Repeater NAC Operation - RX NAC ≠ TX NAC

3.3.1 Feature Overview

Voice messages transmitted with one NAC are accepted and repeated with a different NAC, while messages without the correct NAC are rejected.

3.3.2 P25 CAP Feature Requirement Description

A fixed conventional repeater shall be capable of transmitting a NAC that is different from the NAC received from the subscriber for all call types.

3.3.3 TIA Conformance

The TIA-102.BAAD-B Conventional Procedures document describes the feature in detail. The TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems document describes the test cases. TIA-102.CABA also provides a traceability table[3] between the test cases in TIA-102.CABA and conventional procedures defined in TA-102.BAAD-B.

TIA 102.BAAD-B Conventional Procedures

- Section 6.1 describes NAC repeater functionality - RX on one NAC, TX on another NAC.

TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems;

- Section 2.4.3 TEST SUITE: Transmit NAC independent of receive NAC – SU Unaddressed voice call

    o Section 2.4.3.4.1 Test case 1 – Independent NAC operation – SU unaddressed voice call

- Section 2.4.4 TEST SUITE: Transmit NAC Independent of Receive NAC – SU Routine Group Call

    o Section 2.4.4.4.1 Test case 1 – Independent NAC operation – SU routine group call

3.3.4 P25 CAP Test Cases

P25 CAP test cases from the *P25-CAB-CAI_TEST_REQ* document are listed below. These test cases are based on the TIA-102 test case shown above. These P25 CAP test cases shall be passed for the SDOC and STR of conventional capable equipment to be eligible to be considered P25 CAP Compliant and eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment web page.

- All test cases under '2.4.3 Transmit NAC Independent of Receive NAC – SU Unaddressed Voice Call' (Conventional REPEAT)

- All test cases under '2.4.4 Transmit NAC Independent of Receive NAC – SU Routine Group Call' (Conventional REPEAT)

3.4 Repeater NAC Operation - Wrong RX NAC, No Repeat

3.4.1 Feature Overview

Rejecting the repeating of incorrectly received NACs provides the repeater owner control over what traffic is repeated to increase coverage and what traffic is not repeated.

3.4.2 P25 CAP Feature Requirement Description

A fixed conventional repeater shall be capable of rejecting a received transmission when the NAC of the received transmission does not match any received NAC allowed by the repeater.

3.4.3 TIA Conformance

The TIA-102.BAAD-B Conventional Procedures document describes the feature in detail. The TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems document describes the test cases. TIA-102.CABA also provides a traceability table[3] between the test cases in TIA-102.CABA and conventional procedures defined in TA-102.BAAD-B.

TIA 102.BAAD-B Conventional Procedures

- Section 6.1 and section 6.4 describes NAC functionality where the repeater function is only enabled with the correct received NAC.

TIA-102.CABA Interoperability Testing for Voice Operation in Conventional Systems

- Section 2.4.1 TEST SUITE: Matching NAC operation and SU unaddressed voice call mode

    o Section 2.4.1.4.1 Test case 1 – Matching NAC operation – Unaddressed call mode

- Section 2.4.2 TEST SUITE: Matching NAC operation – SU routine group call mode

    o Section 2.4.2.4.1 Test case 1 – Matching NAC - SU routine group call

3.4.4 P25 CAP Test Cases

P25 CAP test cases from the *P25-CAB-CAI_TEST_REQ* document are listed below. These test cases are based on the TIA-102 test case shown above. These P25 CAP test cases shall be passed for the SDOC and STR of conventional capable equipment to be eligible to be considered P25 CAP Compliant and eligible for posting on the P25 CAP Approved (Grant Eligible) Equipment web page.

- All test cases under '2.4.1 Matching NAC Operation and SU Unaddressed Voice Call' (Conventional REPEAT)

- All test cases under '2.4.2 Matching NAC Operation – SU Routine Group Call Model' (Conventional REPEAT)

- End -