Testing Controllers for NMOS Compliance

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Audio Engineering Society · AIMS Alliance for IP Media Solutions · AMWA Networked Media. Working. · EBU · SMPTE · VSF Video Services Forum

Overview

- JT-NM Tested event in August 2022 used **automated controller testing** for the first time
- How did we get to this point?
  - What is NMOS?
  - What do we mean by a controller?
  - What NMOS features should a controller support?
  - What is the NMOS Testing Tool?
  - How was automated controller testing added to the NMOS Testing Tool?
  - How can I run the tests myself?
  - How was it used at JT-NM Tested?
  - What's next for controller testing?

What is NMOS?

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- Networked Media Open Specifications
  - Set of **open APIs** for managing devices on professional media networks
  - Allow **interoperability** between different manufacturers' devices
  - Use standard **RESTful APIs** using HTTP GET, PUT, PATCH, DELETE with JSON payloads and WebSocket for notifications of updates

AMWA networked media NMOS open specifications

- IS-04 – Discovery and Registration
- IS-05 – Connection Management
- IS-06 – Network Control
- IS-07 – Event and Tally
- IS-08 – Audio Channel Mapping
- IS-09 – System
- IS-10 – Authorisation
- BCP-002 – Grouping
- BCP-003 – Security
- BCP-004 – Receiver Capabilities

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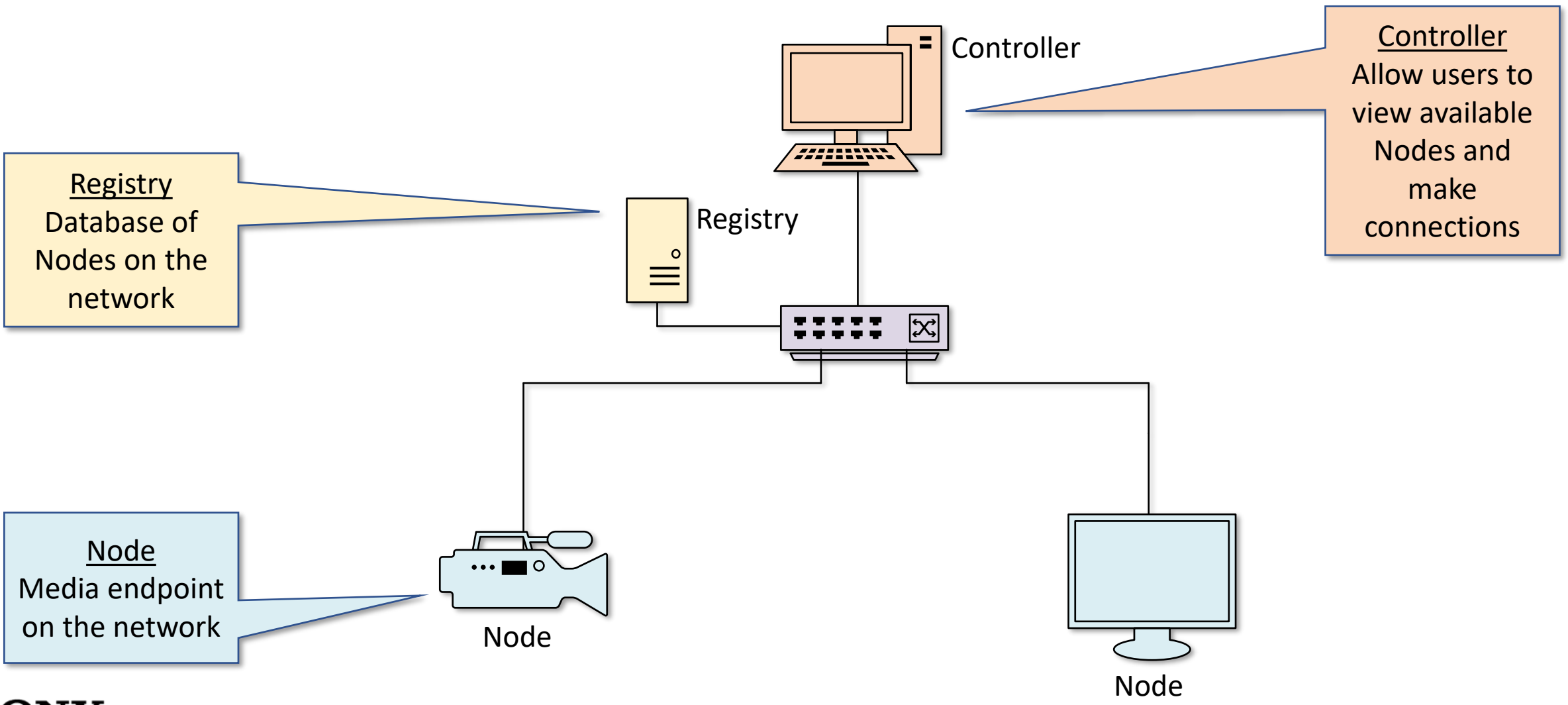
What do we mean by a controller?



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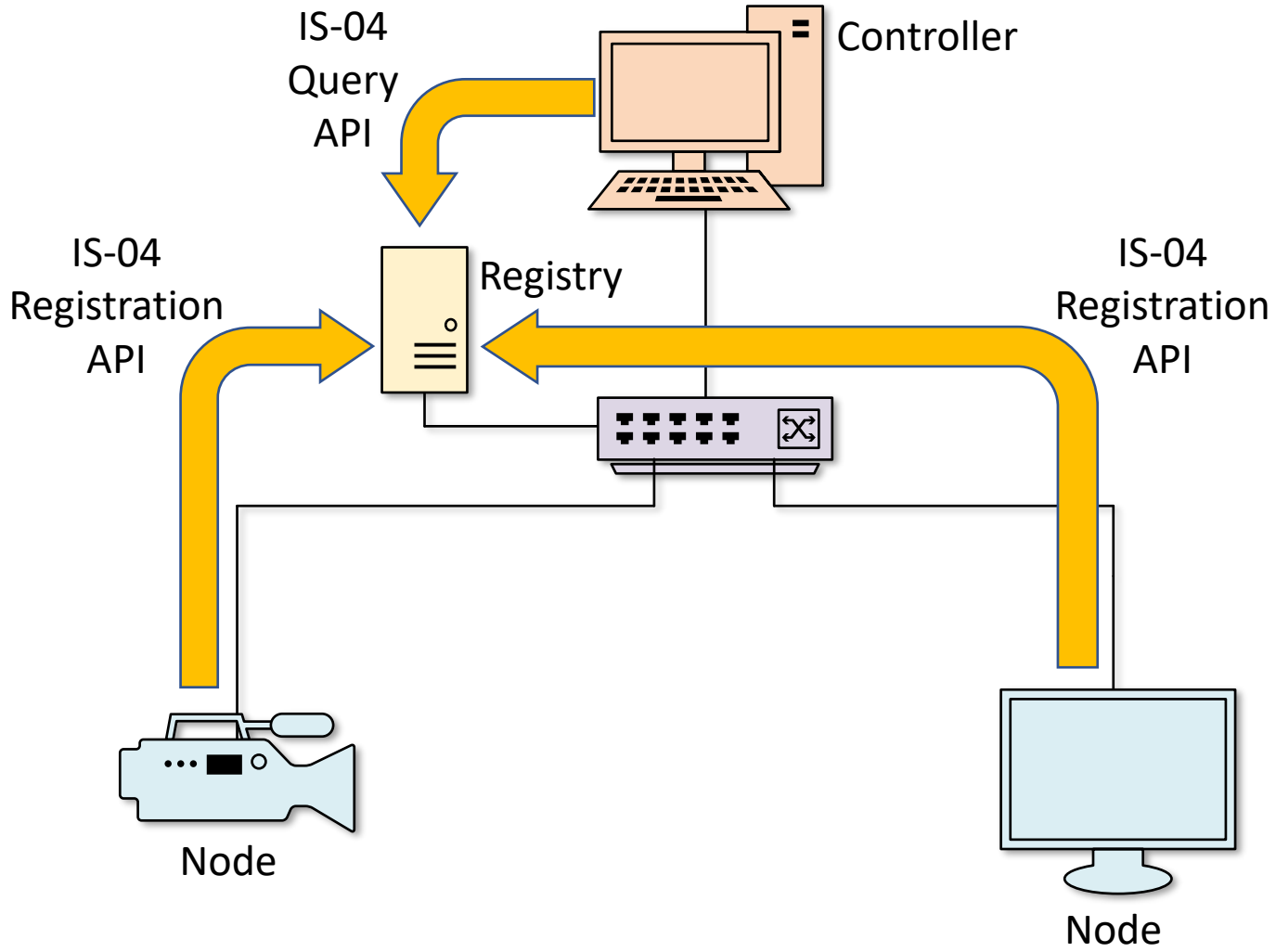
What NMOS features should a controller support?

IS-04
Discovery &
Registration



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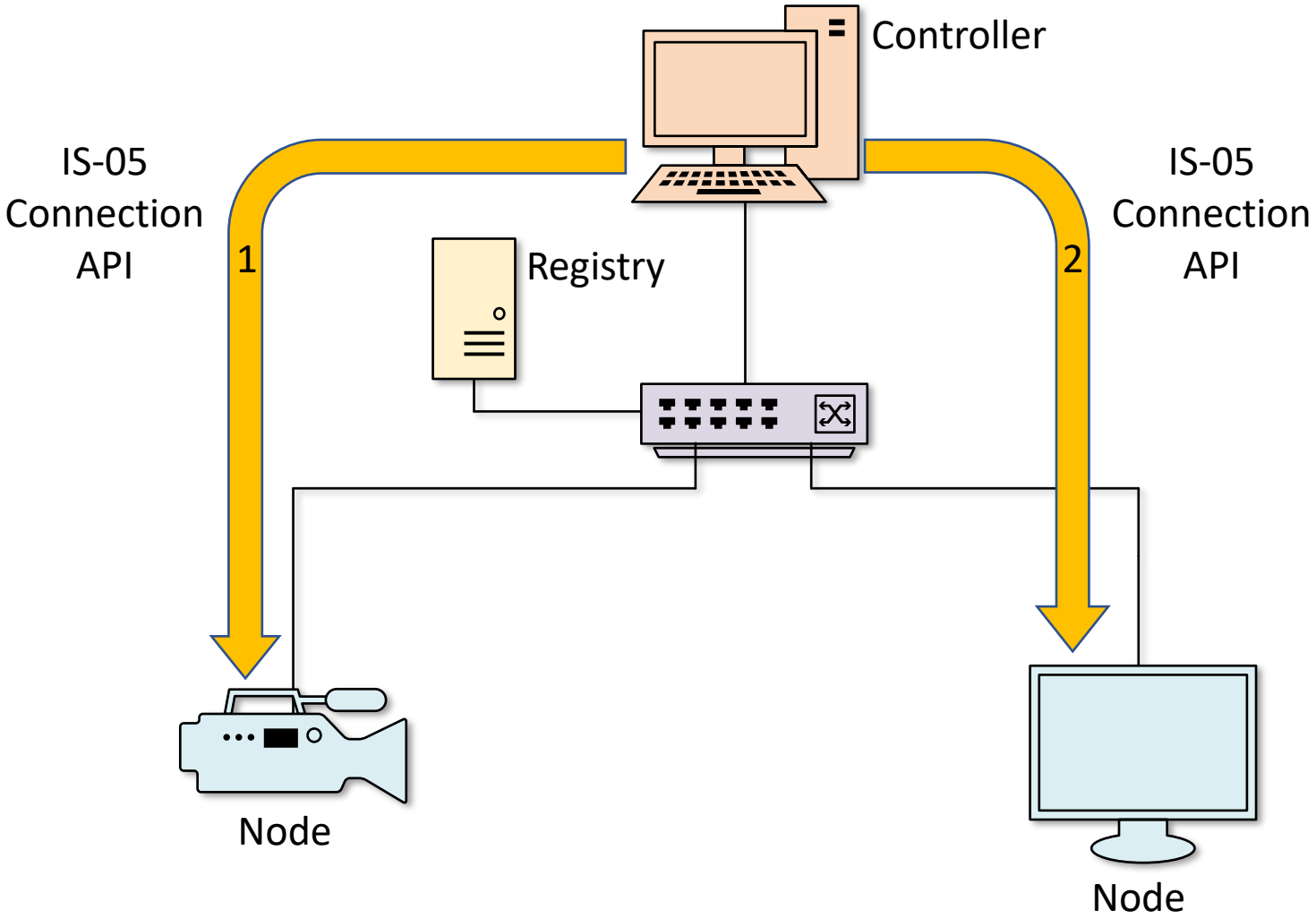
What NMOS features should a controller support?

IS-05 Connection Management



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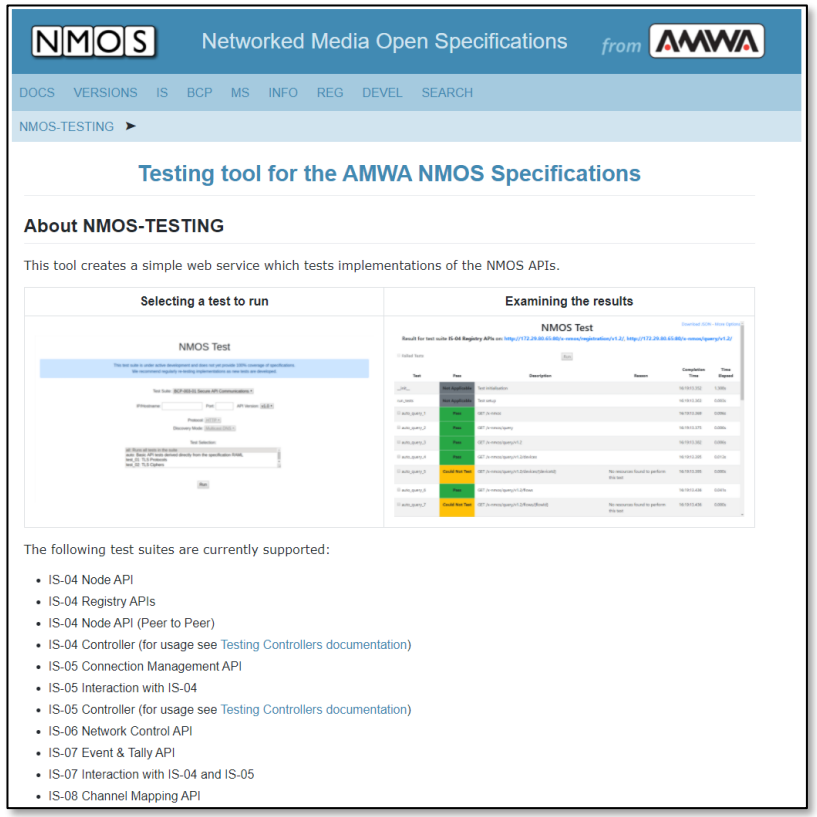
What is the NMOS Testing Tool?

- Open source software
- Freely available from AMWA GitHub site
- Developed collaboratively by AMWA members
- Ensures that professional media equipment conforms to the NMOS specifications correctly
- Allows vendors, systems integrators and end users to self-test their equipment
- Used at JT-NM Tested events
- Key tool in the drive to better interoperability



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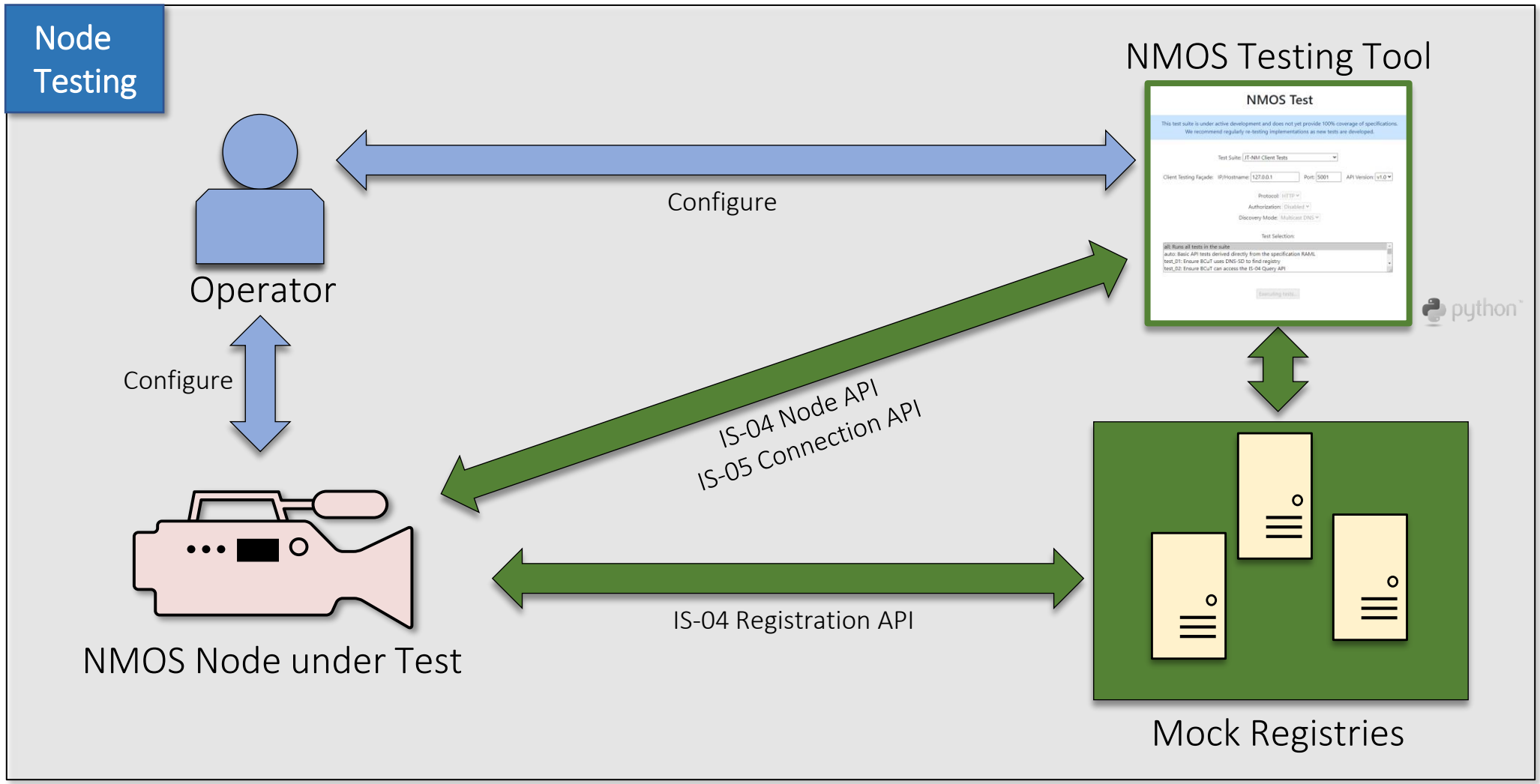
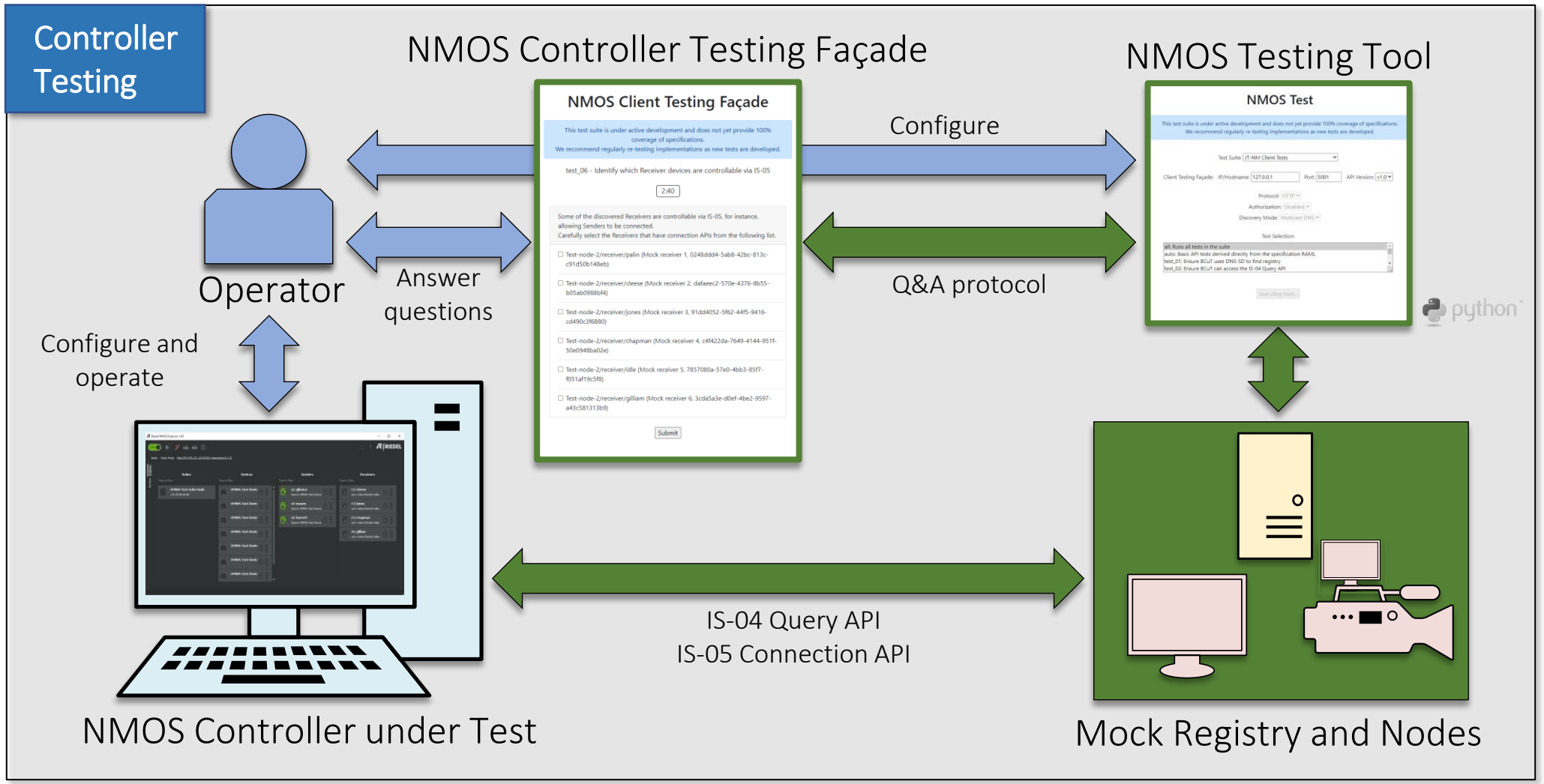
What is the NMOS Testing Tool?



How was automated controller testing added to the NMOS Testing Tool?



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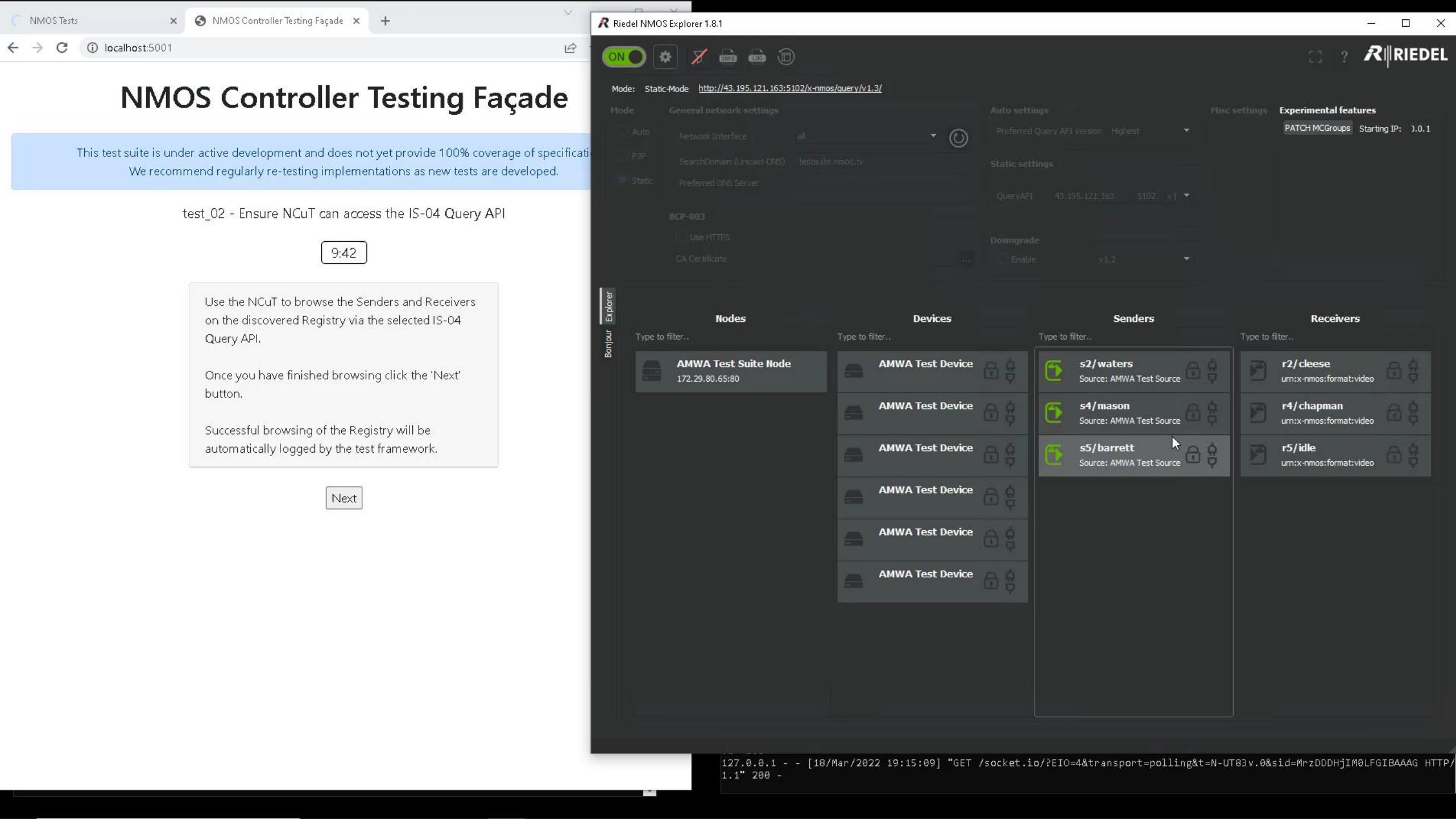
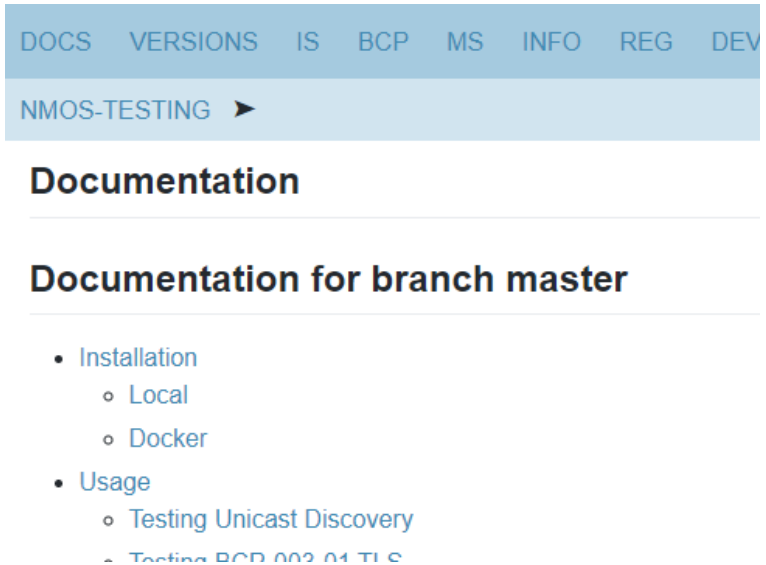
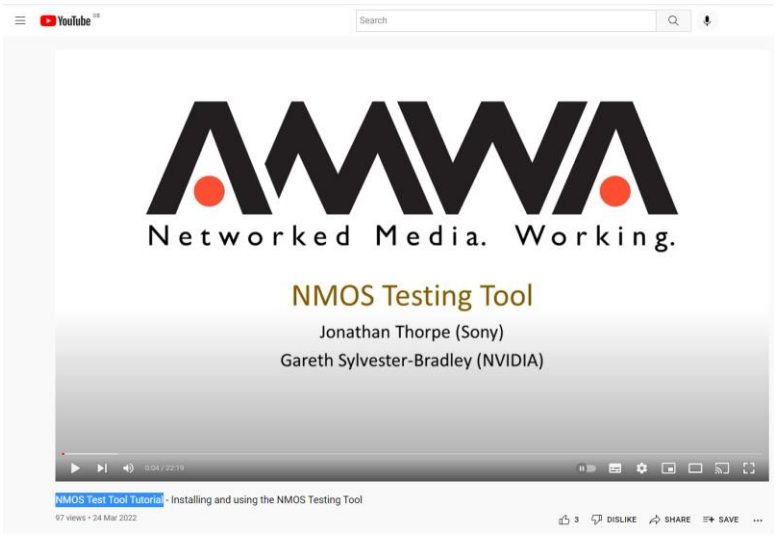

NMOS Tests
NMOS Controller Testing Façade
localhost:5001
NMOS Controller Testing Façade
This test suite is under active development and does not yet provide 100% coverage of specificati
We recommend regularly re-testing implementations as new tests are developed.
test_02 - Ensure NCuT can access the IS-04 Query API
9:42
Use the NCuT to browse the Senders and Receivers on the discovered Registry via the selected IS-04 Query API.
Once you have finished browsing click the 'Next' button.
Successful browsing of the Registry will be automatically logged by the test framework.
Next
Riedel NMOS Explorer 1.8.1
ON
RIEDEL
Mode: Static-Mode http://43.195.121.163:5102/x-nmos/query/v1.3/
Mode
Auto
P2P
Static
General network settings
Network Interface
SearchDomain (Unicast-DNS)
Preferred DNS Server
BCP-003
Use HTTPS
CA Certificate
Auto settings
Preferred Query API version Highest
Static settings
QueryAPI
Downgrade
Enable
Misc settings
Experimental features
PATCH MCGroups
Starting IP:
Explorer
Bonjour
Nodes
Type to filter..
AMWA Test Suite Node
172.29.80.65:80
Devices
Type to filter..
AMWA Test Device
AMWA Test Device
AMWA Test Device
AMWA Test Device
AMWA Test Device
AMWA Test Device
Senders
Type to filter..
s2/waters
Source: AMWA Test Source
s4/mason
Source: AMWA Test Source
s5/barrett
Source: AMWA Test Source
Receivers
Type to filter..
r2/cleese
urn:x-nmos:format:video
r4/chapman
urn:x-nmos:format:video
r5/idle
urn:x-nmos:format:video
127.0.0.1 - - [18/Mar/2022 19:15:09] "GET /socket.io/?EIO=4&transport=polling&t=N-UT83v.0&sid=MrzDDDHjIM0LFGIBAAAG HTTP/1.1" 200 -

How can I run the tests myself?

- https://specs.amwa.tv/nmos-testing/
- (Search: AMWA NMOS Test Tool on Google)



- https://www.youtube.com/watch?v=cfVSSD9hQO4
- (Search: NMOS Test Tool Tutorial on YouTube)

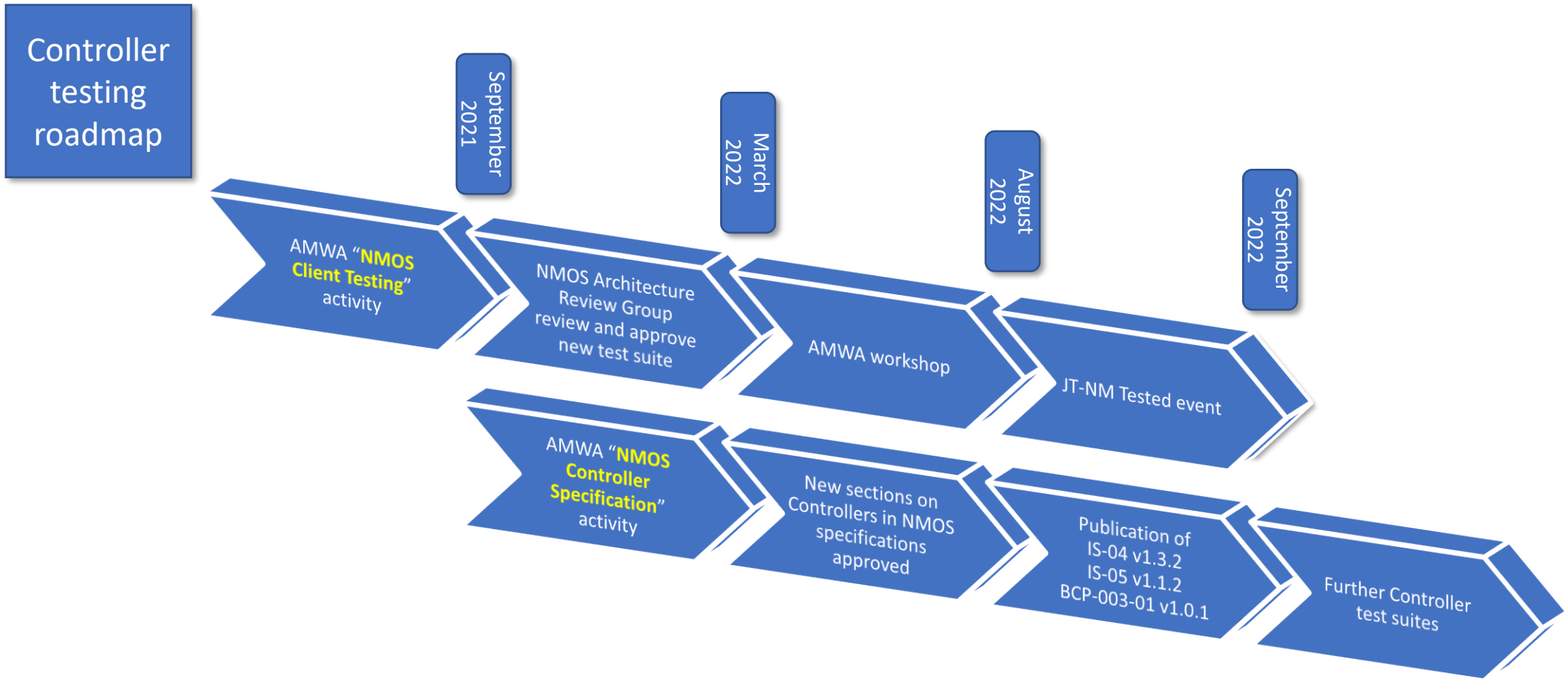


How was it used at JT-NM Tested?

- There have now been four JT-NM Tested events
- Controller testing was introduced at the third event but was a manual process
- Automated controller testing was introduced at this year's event

JT-NM Tested Event	NMOS Node testing	NMOS Registry testing	NMOS Controller testing
March 2019	No	No	No
August 2019	Yes	No	No
March 2020 (Virtual)	Yes	Yes	Yes (Manual)
August 2022	Yes	Yes	Yes

What's next for controller testing?



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What's next for controller testing?

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NMOS Networked Media Open Specifications from AMWA

DOCS APIS EXAMPLES VERSIONS IS BCP MS INFO

IS-04 ➤ releases ➤ v1.3.2 ➤ docs ➤

Controllers

←Behaviour - Nodes · Index↑ · Data Model→

Introduction

A Controller is Client software that interacts with the NMOS APIs to
Devices, Senders and Receivers) within a networked media system.

- This document includes normative references to be followed when impler
- This document covers how the Controller interacts with the NMOS APIs c
  software, such as presentation.
- This document does not cover any requirements relating to where a Cont
  monitoring information via IS-07).

Where this document refers to a User, this can include both hum
automation systems that drive a Controller programmatically.

General

HTTP APIs

Trailing Slashes

Controllers appending paths to `href` type attributes MUST support
avoid doubled or missing slashes.

Controllers performing requests other than `GET` or `HEAD` (i.e `PUT`,
no trailing slash present.

API Versions

The versioning format is `v<MAJOR>.<MINOR>`

- performed for non-breaking changes (such as
- performed for breaking changes (such as the

ted as complete strings. Parsing MUST p
using the point (.) as a delimiter. Compare integer representations

IS-04

NMOS Networked Media Open Specifications from AMWA

DOCS APIS EXAMPLES VERSIONS IS BCP MS INFO

IS-05 ➤ releases ➤ v1.1.2 ➤ docs ➤

Controllers

←Behaviour - WebSocket Transport Type · Index↑ · Upgrade Path→

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New Controller sections in specifications

General

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IS-05

NMOS Networked Media Open Specifications from AMWA

DOCS VERSIONS IS BCP MS INFO REG DEVEL SEARCH

BCP-003-01 ➤ releases ➤ v1.0.1 ➤ docs ➤

Controllers

←Secure Communication · Index↑

Introduction

A Controller is Client software that interacts with the NMOS APIs to discover, connect and manage resources (Nodes, Devices, Senders and Receivers) within a networked media system.

his document includes normative references to be followed when implementing a secure Controller.

his document covers how the Controller interacts with the NMOS APIs only. It does not cover other features of the Controller
ftware, such as presentation.

his document does not cover any requirements relating to where a Controller is additionally acting as a Node (e.g. receiving
onitoring information via IS-07).

e this document refers to a User, this can include both human operators who drive a Controller manually and automation systems that drive a Controller programmatically.

Secure Controller

Secure Communications

An NMOS system with secure commmunication is one in which Controllers, Nodes, Registries, and other servers, both support and have been configured to enable the security requirements described in this specification.

Where a Controller has been configured to enable secure communication channels the implementation of such secure communication channel MUST follow the requirements in this specification.

Execution Environment

A secure Controller MAY delegate fully or partially the establishment of secure communication channels to services in the execution environment.

Collectively, the Controller and those services MUST fulfil the requirements in this specification.

A Controller MUST only delegate to services that fulfil the following requirements and recommendations.

T

Se ts set out in the TLS section of the Secure Communications document in this specification.

BCP-003-01

NMOS Networked Media Open Specifications from AMWA

HOME DOCS VERSIONS IS BCP MS INFO REG DEVEL SEARCH

NMOS Controller Implementation Guide

Index↑

Scope

This document is intended as a guide for implementers or users of Controllers within NMOS-enabled networked media systems. The document defines what a Controller is and outlines the requirements of a Controller with respect to each existing NMOS specification through references to the relevant sections of those documents.

The document focuses primarily on guidance for the following NMOS specifications:

- IS-04
- IS-05
- BCP-003-01

However, this is a living document and it is intended that fuller guidance for other NMOS specifications be added in future.

The NMOS Glossa

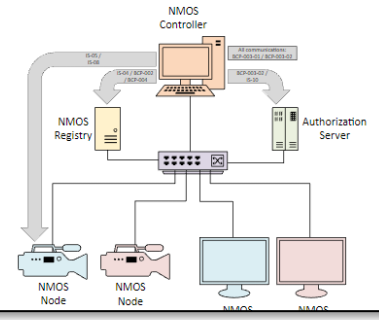
Use of Norma

This document is a guidance around the normative req this guide and the specifications ords found in this document are not to be interpreted as RFC 2119 key words.

Controller implementation guide

Controller Definition

A Controller is Client software that interacts with the NMOS APIs to discover, connect and manage resources (Nodes, Devices, Senders and Receivers) within a networked media system. The diagram below shows some of those API interactions with other NMOS system components.



INFO-005

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https://specs.amwa.tv

Any Questions?

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