Networked Media Systems
- the Big Picture -

As Internet Protocol (IP) based systems are being discussed at length and being built in increasing numbers, it is worth stepping away from the detail to see how a typical system fits together. This gives us an opportunity to understand the key elements of a networked system and the technologies that enable their success.

This document seeks to explain how the functionality of traditional systems is achieved using IP-based infrastructures and to illustrate how current and emerging technologies work together to go further and enable a fully networked media system. It also explains how this is delivered by trade associations and their members across our industry.

A good place to start is to examine a simplified overview.

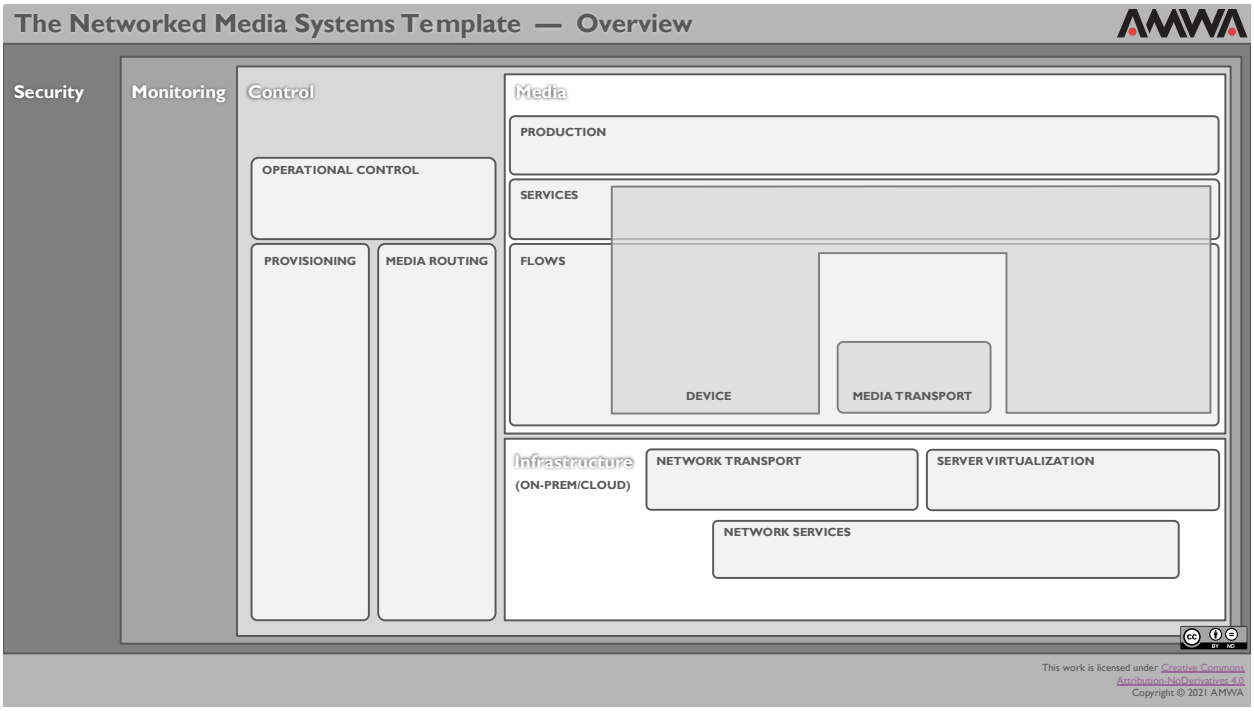

Illustration 1 Networked Media Systems Template – Overview

This drawing shows, at a high level, all of the major blocks of functionality required in a generic networked media facility.

The Networked Media System Template has four distinct layers – Media & Infrastructure, Control, Monitoring and Security. Note that the layers stack, one upon another. (Underlined text relates to the main headings in the illustration.)

MEDIA & INFRASTRUCTURE – This layer consists of the tools and infrastructure needed to create and transport professional media. Moving from top to bottom within this layer, we see that a PRODUCTION department uses SERVICES to create and consume media FLOWS. Those flows exist in a facility that uses an IT-based infrastructure, whether that infrastructure is

on premises, or in the cloud. The services used by the creative process are provided by DEVICES (either hardware or software), interconnected by MEDIA TRANSPORTS.

CONTROL – While media is at the core of our business, it has no value without the control layer. The control layer allows creative personnel to exercise operational control over the production facility during the production process. At lower levels of the control layer, services and devices are provisioned, and media flows are routed where they are needed.

MONITORING – This layer provides critical information about the status of the media facility and allows personnel to be able to quickly identify and address problems.

SECURITY – If you look carefully, you will see that the security layer acts across the entire Networked Media System Template providing controlled access to other layers of the template. Security is important, but it is not necessarily interoperable, unless a rather significant amount of work has been put into making it so. The AMWA has worked hard to develop an open and interoperable set of security best practices for the use of NMOS interfaces in media facilities.

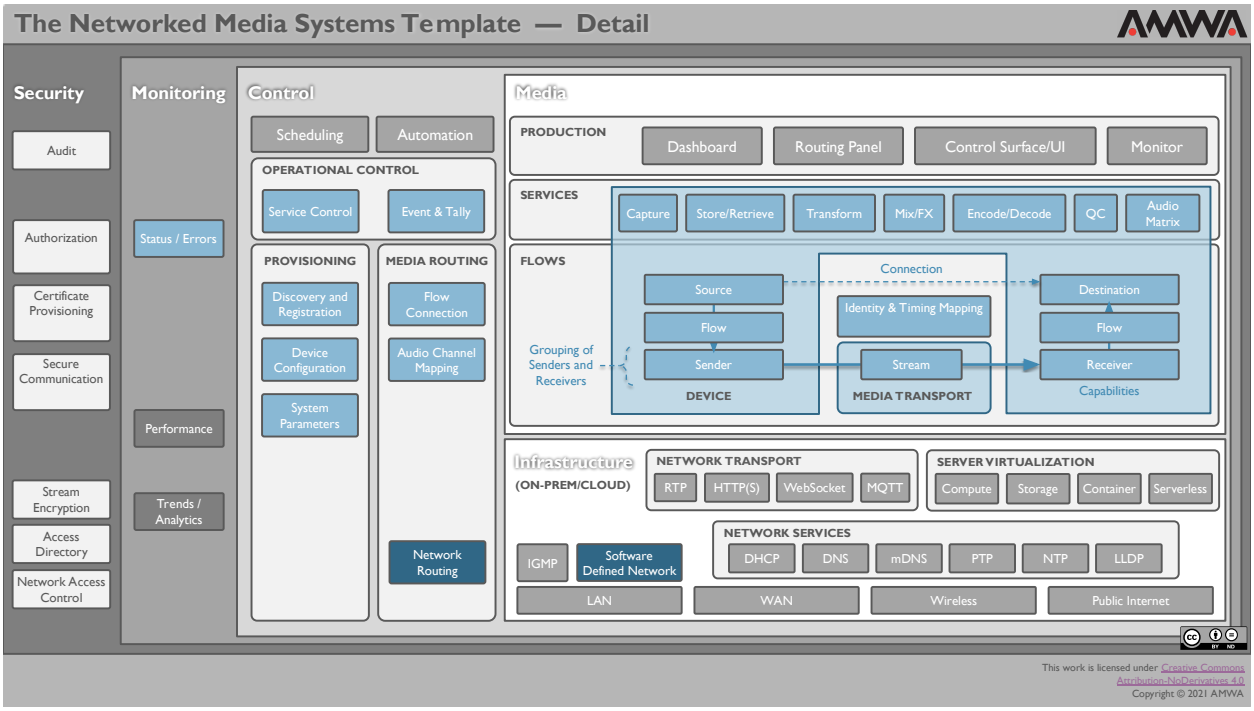

Illustration 2 Networked Media Systems Template – Detail

This graphic provides additional detail regarding the sorts of elements that exist on each level. For example, in the Media layer, production personnel frequently interact with media facilities through routing panels and control surfaces. In the Monitoring layer, one can see that it is important to not only monitor the status of elements of the media system, but also to look at the performance of elements of the system and observe trends over time. Other required elements are also shown. Importantly, at the Security layer, detail has been added, illustrating that security is required from the application level all the way down to the network infrastructure.

A successful transition from traditional point-to-point, hard-wired infrastructures to a network-based approach requires contributions from many specialist organizations. Key to the success

has been input from all of the Joint Task Force on Networked Media (JT-NM) members, the AES, AMWA, EBU, SMPTE and VSF. Each of these brought important skills and experience.

Wherever possible, the JT-NM contributors have drawn on existing standards or specifications. This has minimized the workload, shortened the development times and helped to ensure compatibility with pre-existing systems such as IT networks. As an example, the entire Infrastructure layer is based on existing IT standards and specifications.

To provide the best long-term solution, some developments resulted in due-process standards, such as SMPTE ST 2110, others in specifications, such as AMWA IS-04. The logic for this is simple. To define a transport stream, there is benefit in ensuring that it is set and agreed in the longer term. To create a software-based interface specification (IS) for control between devices it is important to allow for future changes as user requirements evolve, while still ensuring that backwards compatibility is maintained.

Also supporting the adoption of networked media systems is the Alliance for IP Media Solutions (AIMS), an industry consortium led by broadcast and ProAV companies. Its contributors are engineers, technical strategists and business executives dedicated to an open-standards approach that moves media companies quickly and profitably from legacy systems to a virtualized, IP-based environment.

How NMOS fits into the System

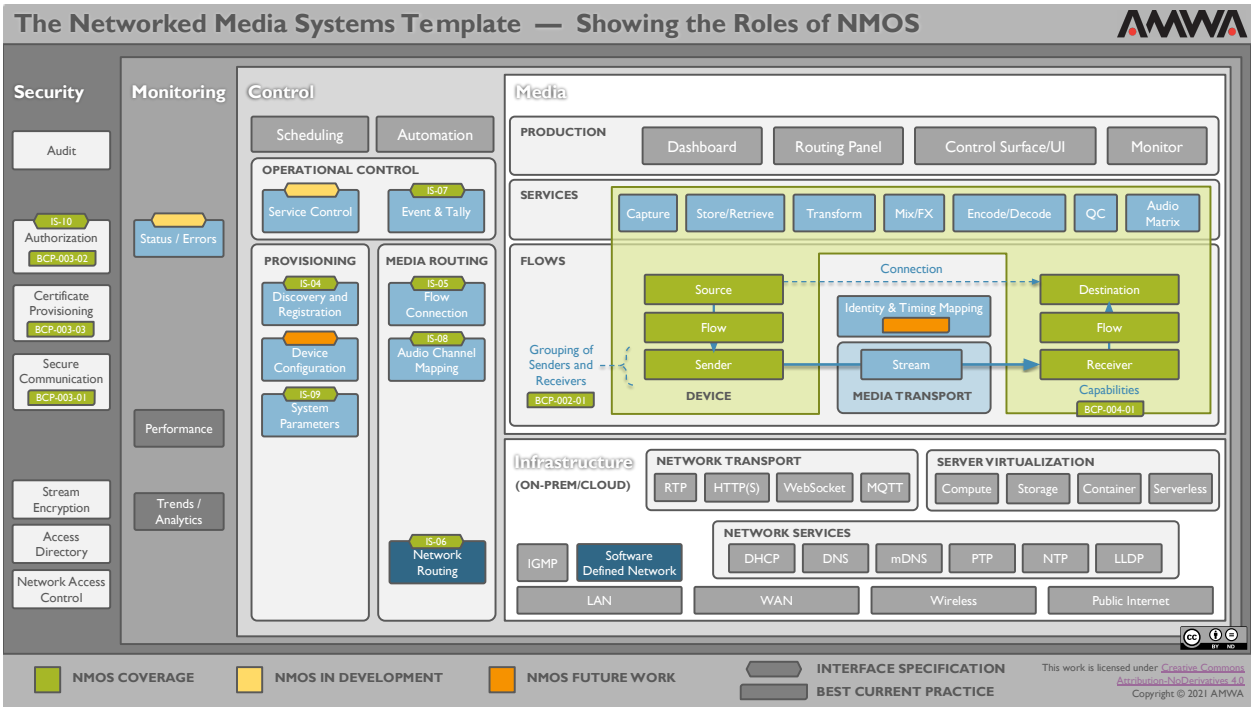

Illustration 3 Networked Media Systems Template – Showing the Roles of NMOS

This graphic is the same as the previous one but with additional detail to show areas where the AMWA is active. The blocks in green are covered by existing AMWA NMOS Specifications. The blocks in yellow are in development. The elements in orange are areas of future work.

Mapping JT-NM TR-1001-1 onto the Template

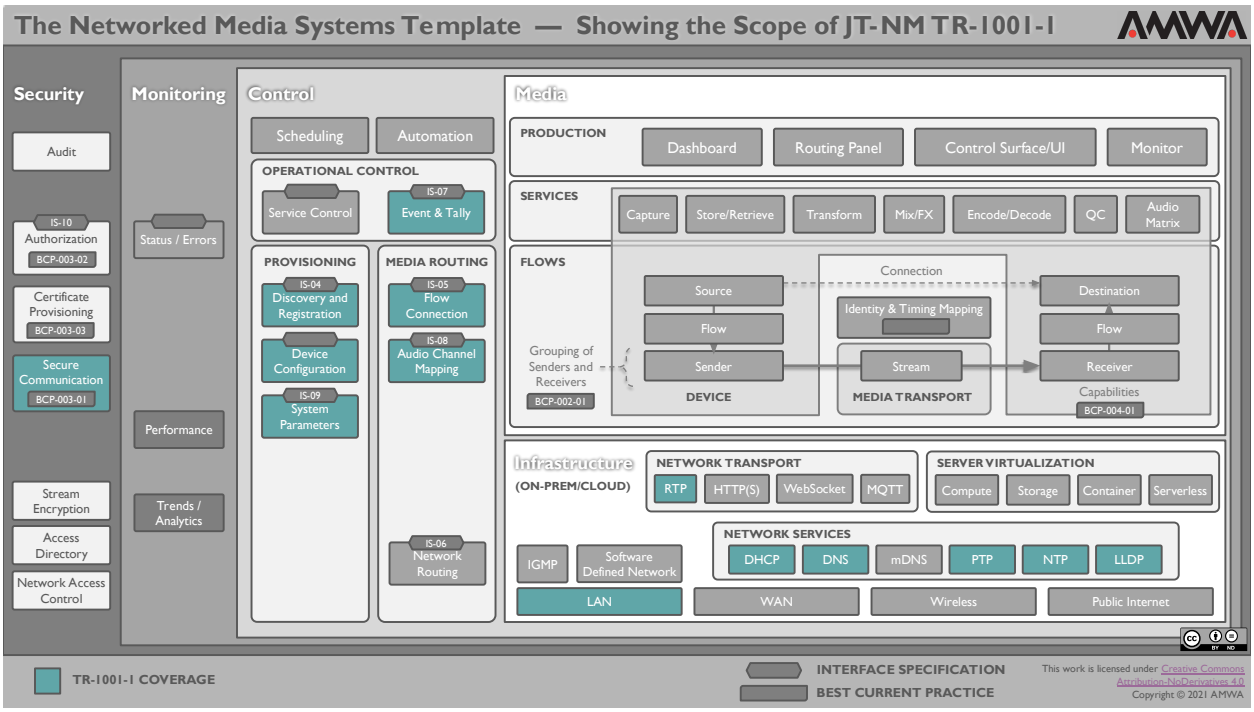

Illustration 4 Networked Media Systems Template – Showing the Scope of JT-NM TR-1001-1

The Networked Media Systems Template may be useful in other contexts. For example, the figure above shows how the JT-NM document, TR-1001-1 maps onto an IP facility. (TR-1001-1 sets out a list of behaviors and network services that are expected in a ST-2110/NMOS facility. It may be downloaded at https://jt-nm.org)

As shown, TR-1001-1 makes extensive use of well-known and battle-tested IT technology and best practices in security, adding media-specific interoperable approaches to things such as audio channel mapping, event & tally, and how facilities should behave during recovery from power failures.

The point here is not that TR-1001-1 is useful, although surely that is the case. Instead, we would point out that the Networked Media Systems Template is useful in showing the big picture of IP-based facilities, allowing users and suppliers to visualize where different components sit within those facilities.

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