

Healthcare Identifies DICOM Imaging Issue With Visibility From nGeniusONE

Since the mid-1990's, Digital Imaging and Communications in Medicine (DICOM) has been a globally adopted protocol for transmitting images throughout a healthcare network and providing a file format to store them. Used in combination with a healthcare's Radiology Information System (RIS), medical images, including X-rays, ultrasounds, echocardiograms (EKGs), and magnetic resonance imaging (MRI), are a vital part of the diagnostic process. As a result, physicians and diagnosticians throughout healthcare networks require access to high-quality images for viewing and analysis, as well as reliable availability to quickly store and retrieve images.

Failure

One healthcare organization that used DICOM for handling medical images was in the process of onboarding a recently acquired remote hospital. As part of this process, the new hospital was attempting to make an association with the primary data center imaging system to ensure that the two DICOM applications (application entities - AEs) would communicate effectively. However, the initial attempts were unsuccessful, and the users were unable to connect to the data center imaging system with DICOM. Given this was a newly added entity with tens of hundreds of new users, modalities, etc., and was remote to the data center and imaging applications using third-party WAN access, the complexity and challenge of understanding the cause of the problem were high.

Impact

As a step in integrating this new remote hospital with the rest of the healthcare organization, the use of the imaging systems was essential. Patients throughout the healthcare network needed to be able to go to any facility, including the new hospital, and be reassured knowing that the doctors could seamlessly access their existing medical images.

Although use of imaging services within either the healthcare facility or the new hospital was not impacted directly, the timeline for meeting the executive's integration goals was at risk. That put a great deal of pressure on the IT team to ensure the DICOM imaging access issue was resolved as quickly as possible.

Troubleshooting

The healthcare organization was a long-time user of NETSCOUT's nGeniusONE® Service Assurance solution. With InfiniStreamNG® appliances strategically deployed in the DICOM imaging ecosystem, packet-based data was being collected and analyzed in real time. The investigation into the access issue began with the notification center, which indicated the service was already showing a high failure rate of nearly 40% for the DICOM protocol.

Troubleshooting further with drill-down into the universal service monitor view for details on the DICOM protocol, their NETSCOUT® Premium Services Engineer (PSE) quickly discovered that more than 89,000 Associate-Reject errors had occurred for the remote hospital entity during the attempted cutover (Figure 1). This confirmed that virtually none of the attempts for access to the data center's imaging system by the remote hospital were successful.

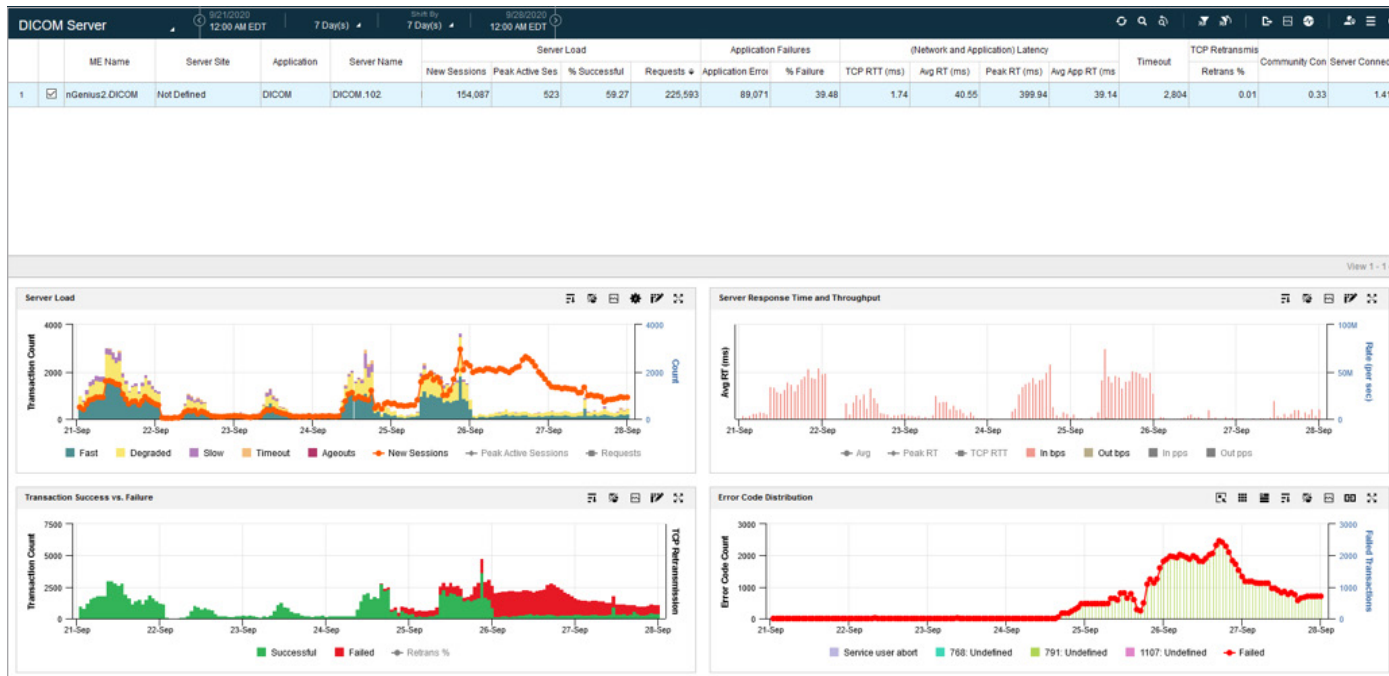


Figure 1: The Universal Service Monitor view in nGeniusONE was able to reveal details related to the inability of the remote hospital to access the healthcare organization’s DICOM imaging systems, with failures reaching 89K instances.

The PSE drilled down further with nGeniusONE, ultimately leveraging the actual packet captures of the reject messages. Through evaluation of a series of packets, it was revealed in one message that the DICOM PDU type (protocol data units) was “Associate-Reject,” and in another, that the “AE title not recognized.” (Figure 2). This rejection reason is often a result of an issue with an application entity not being known or recognized. The PSE proceeded to share the details of the investigation to the healthcare IT team for next steps in the escalation process.

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PACKET: #6 2020/09/28 00:00:02.200.100.002(UTC); Length=68 bytes; Captured=68 bytes
ETHERNET: S=[90-E2-FF-E0-80-00], D=[00-00-BA-80-E0-00], EtherType=0x0800
IP: S=10.10.100.10 D=13.13.110.110 LEN=30, ID=32132, Offset=0, Proto=TCP;
TCP: S=104(DICOM) D=32132 LEN=10 SEQ=855887885 ACK=1339654792 WIN=49640
DICOM: ----- DICOM -----
  PDU Type           = 3 (Associate-Reject)
  Reserved           = 0
  PDU-Length         = 4 bytes
  Reserved           = 0
  Result             = 1 Rejected-Permanent
  Source             = 1 DICOM UL service-user
  Reason/Diag        = 7 called AE title not recognized
    
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Figure 2: Drill-down further into the DICOM protocol using nGeniusONE provides packet decode details to reveal the cause of the failures. Note the PDU type was “Associate-Reject” and the Reason/Diagnosis was “AE title not recognized.”

Remediation

The application team and DICOM administrators review of the details from the nGeniusONE solution led to a determination that the new hospital entity was missing from the healthcare’s DICOM system configuration, which caused the rejections when the cutover was initiated. The title for the remote hospital entity was added to the DICOM system at the data center, which subsequently allowed for successful associations. The issue itself ceased once the configuration update was made.

Summary

nGeniusONE provided the views and insights with session analysis and deep-dive, packet-level details with error information that made it possible for this healthcare to identify the configuration settings issue in the data center DICOM system. Adding the remote hospital as an AE in the system and subsequent successful exchanges of images marked a major step in the executive plan to integrate the acquired hospital with the overall healthcare environment. Ultimately, this will enable better support of their mutual patient community.



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