Troubleshooting WLAN with NSight

HOW TO GUIDE

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PREFACE

A typical IT department handles dozens of support calls from the users related to connectivity issues. Their task is to determine whether the problem is specific to one particular user or whether it is a larger network issue that needs to be addressed by the network operations team.

A network administrator on the other hand must be able to constantly monitor the health of the wireless network and be able to not only resolve issues quickly, but also predict problems and address them before they will cause any negative impact.

The challenge of many networks is lack of proper tools to diagnose a problem. Typically any connectivity issue is escalated to the network team, as support desk is unable to resolve client-related issues by themselves.

This results in the support desk escalation of very simple user issues to the network operations team, often overloading the team. In some cases even these resources require additional support directly from the vendor, further escalating the issue and increasing time to resolution. None of this would have happened if service desk had easy to use tools to monitor and troubleshoot wireless user state or network admin had full visibility and control over their wireless network.

Among the most common issues as reported by users are:

- “I cannot connect to your Wireless Network”
- “Connection keeps dropping when I’m moving”
- “Your Wireless Network is slow”

INTRODUCING NSIGHT

NSight Advanced Management platform from Zebra Technologies provides ability to address customer issues and monitor wireless network health with a variety of easy to use user-centric tools. This paper will address common use-cases and provide generic workflow examples on how NSight can be leveraged for troubleshooting client connectivity and roaming related issues.

HOW TO USE NSIGHT TO SOLVE CLIENT ISSUES FASTER

NSight is divided in to four functions, each offering tools to help different personnel resolve customer issues. Some tools are designed to help first line support, while some would better suit an experienced network administrator to provide overall view on the network and help predicting and resolving problems before they become urgent.

Custom Dashboards

NSight offers multi-user multi-screen customizable dashboards. The users can drag-n-drop widgets to their dashboard screens to get information that is most relevant to them instead of searching through multiple screens. It offers more than 20 widgets that can be used to graphically view various trend charts on the network and user statistics, like utilization, security, device inventory, client details, RF health etc. For troubleshooting purposes client details and RF health dashboards will provide

Real-Time Monitoring

NSight provides an ability to monitor client or Access Point behavior in real time, helping immensely in troubleshooting, while the issue is occurring at the same time.

Reporting

Pre-canned Reports and Custom Reports capture key metrics on Usage Trends, Network Health, Security, Compliance and Device Inventory. The reports can be generated on-demand or scheduled to be mailed periodically. Reports are a great tool to provide historic data on issue that was happening in the past, but has been reported only recently.

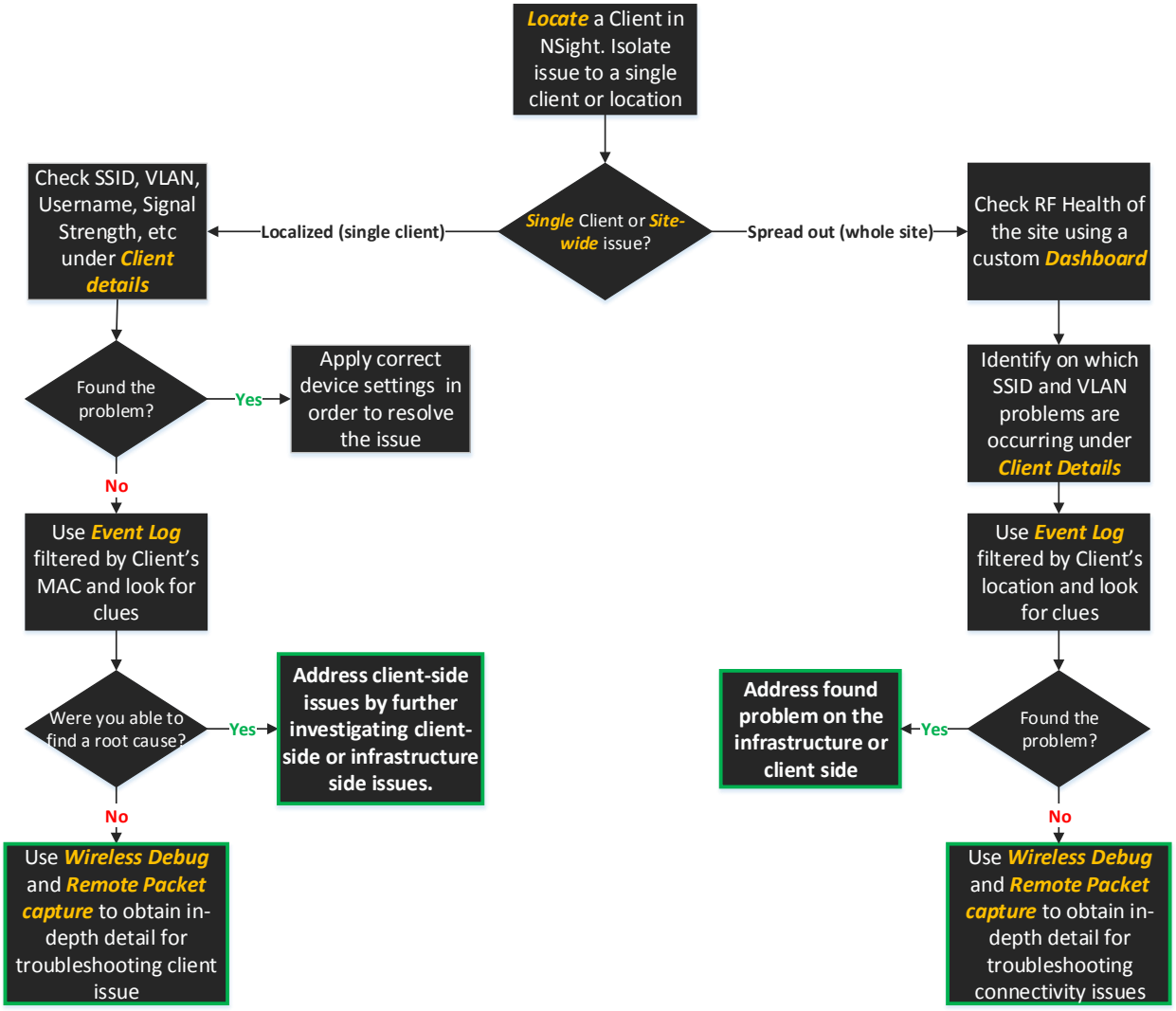
Advanced Live Troubleshooting

NSight offers advanced troubleshooting tools that can be used by the Level 1 or Level 2 Helpdesk for fast and effective troubleshooting, minimizing escalations to the network engineers. Network operations team can leverage remote wireless debug and remote packet capture tools in NSight to dig deeper in diagnosing the issue.

CLIENT TROUBLESHOOTING WORKFLOW – EXAMPLE 1

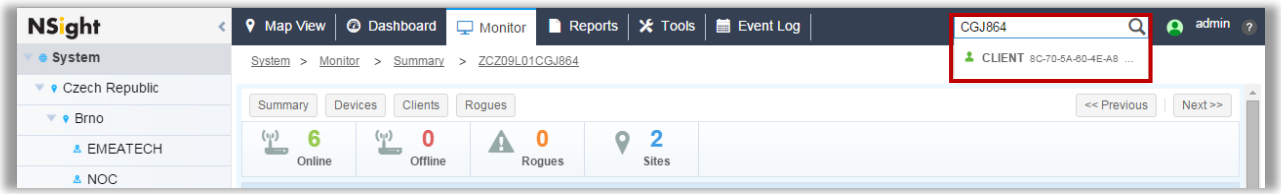
Problem: Client connectivity issues or "I cannot connect to your Wireless Network"

How to address client association issues using NSight – Flowchart

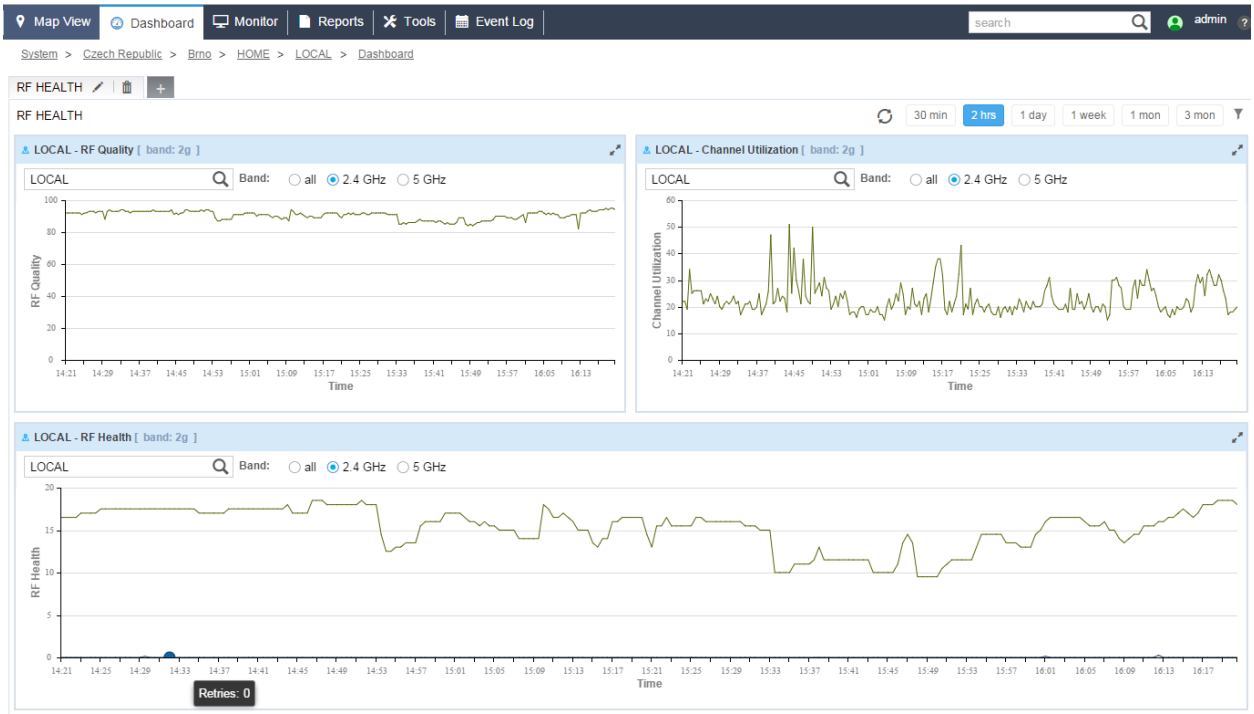


HOW TO ADDRESS CLIENT ASSOCIATION ISSUES USING NSIGHT APPROACH

1. Identify location and user MAC address by asking the user and confirm it in NSight. The easiest way to find a client is by searching for its MAC address or part of the Hostname in the upper right corner of the UI:

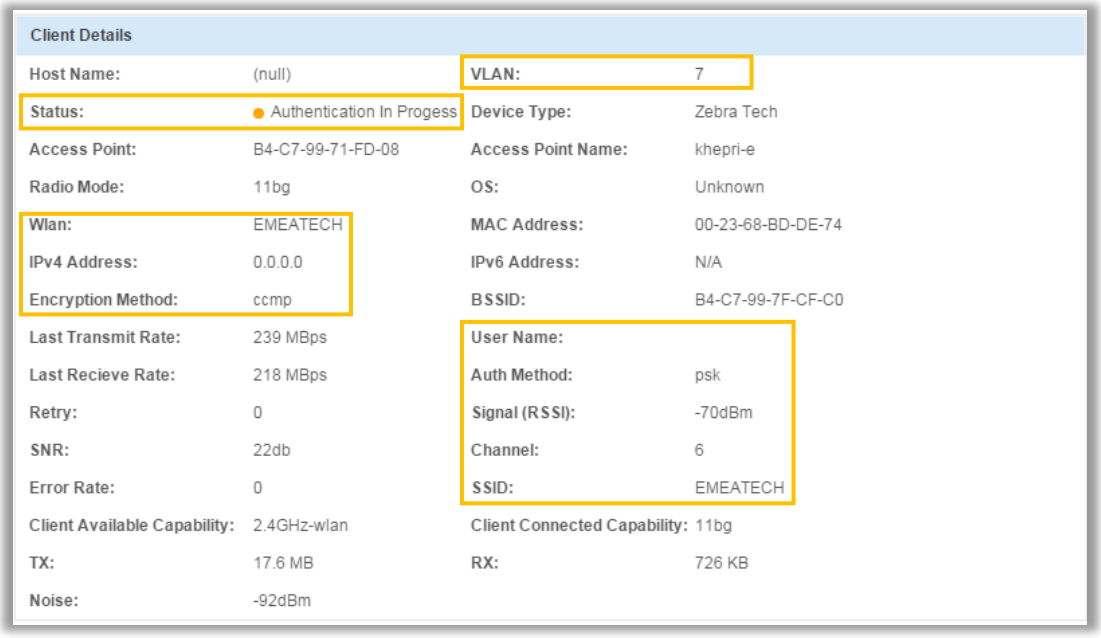


2. (In the event the issue is spread across the whole site). Create a custom dashboard and verify RF health, channel utilization at the site (in the widgets below - always set the RFD name as a site identifier). Check if the RF environment is a possible cause of connectivity issues affecting a location:

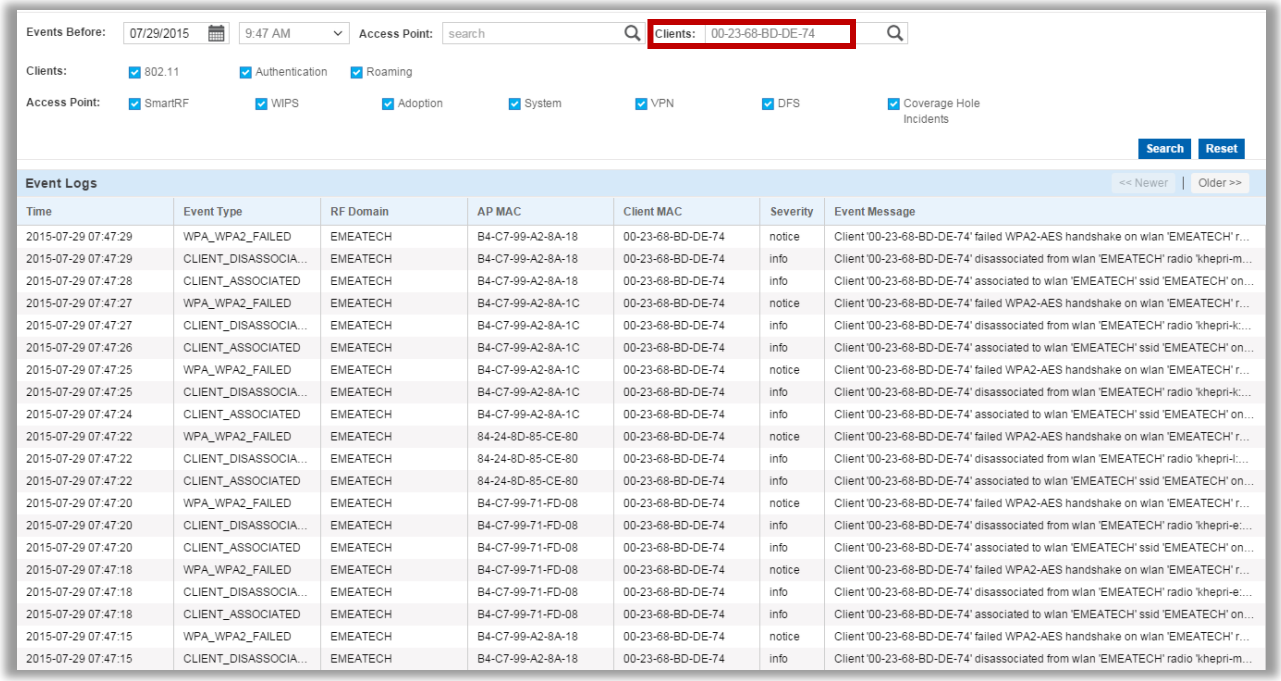


Note: using time-based filter can either provide close to real-time information or a historical snapshot of the environment for the specified time frame.

3. Confirm that client is trying to associate to the correct SSID. Check client current status. If it is having trouble associating you would likely see 'authentication in progress' or 'disassociated' if the client is not currently active. Check which authentication method is in use on this WLAN (i.e. PSK or any of the EAP methods etc). If any of the EAP methods are in use verify that the Username is correct. Verify that the client is assigned a correct VLAN ID based on which SSID it is associating to. It may even happen that client can in fact connect to the wireless network, but failing to get an IPv4 address via DHCP.



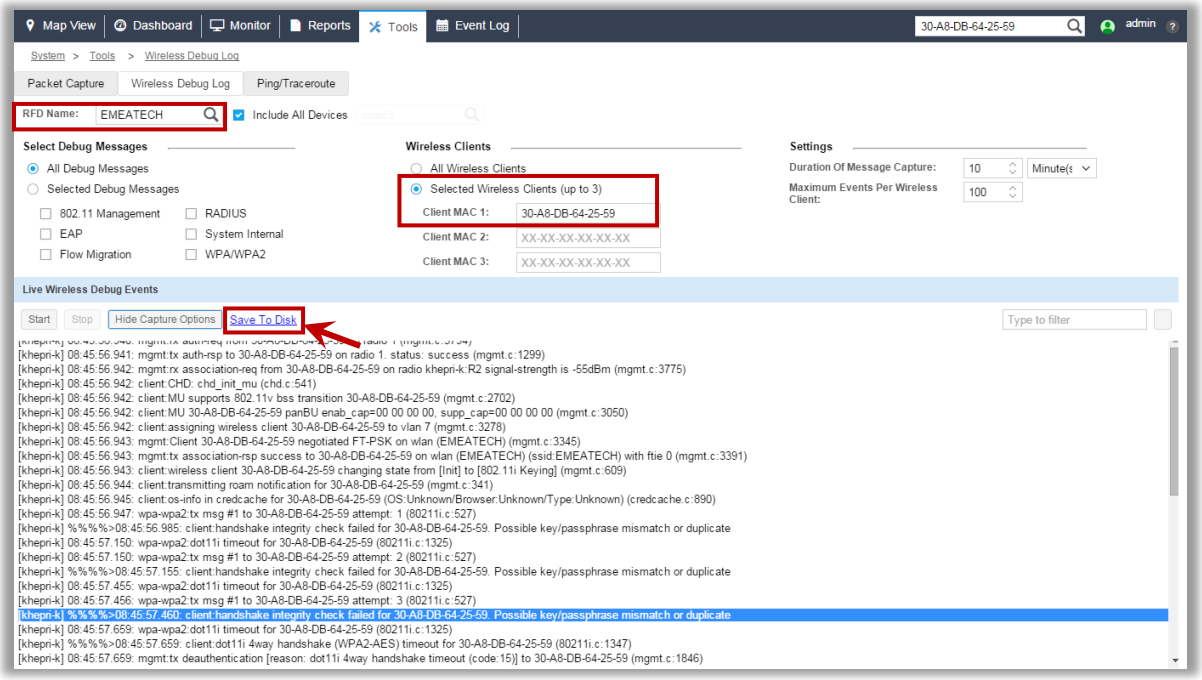
4. Click on the client's MAC address and then click on Event Log to see logs filtered for this particular user. Event Log will provide historical data for the specified client and time frame.



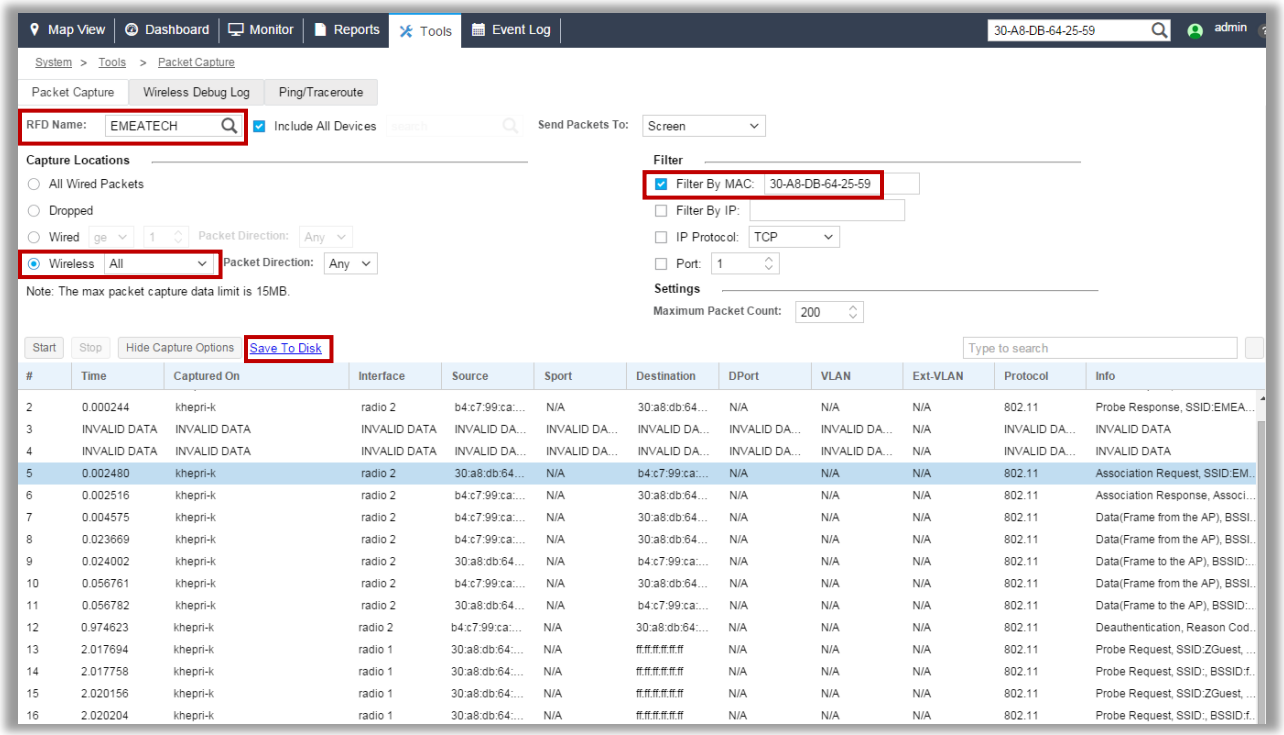
5. If event logs are not providing enough information and issue appears to be more complicated, leverage advance remote debug and remote packet capture tools in order to get detailed info on what exactly is happening to the particular client while capturing packets / debug logs. This data will be useful for network ops team for deeper investigation on client connectivity issue:

   The remote troubleshooting tools in NSight are very powerful and provide in-depth view of the network, enabling the root cause to be identified and the problem resolved.

   In order to perform remote debug wireless or remote packet capture specify the RF Domain name where you want to capture information from and filter by the client's MAC address. More detailed description of Remote troubleshooting tools is available in "Remote Debug How To"



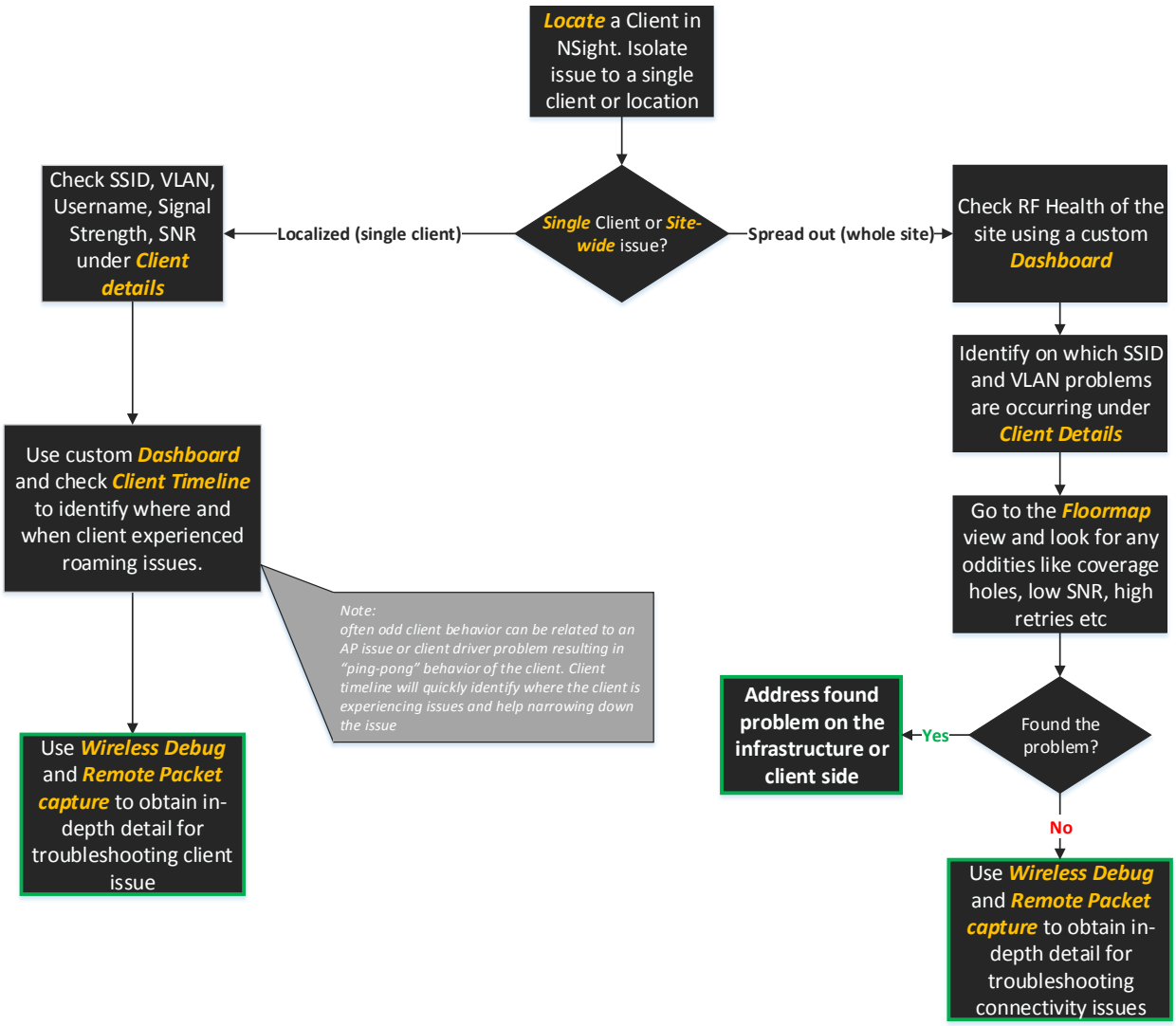
Note: It is recommended to save both wireless debug log and packet capture to disk as a file and ask network ops team for data analysis.



CLIENT TROUBLESHOOTING WORKFLOW – EXAMPLE 2

Problem: Roaming issues or "My connection/voice call/video stream keeps dropping when moving"

How to address client roaming issues using NSight – Flowchart



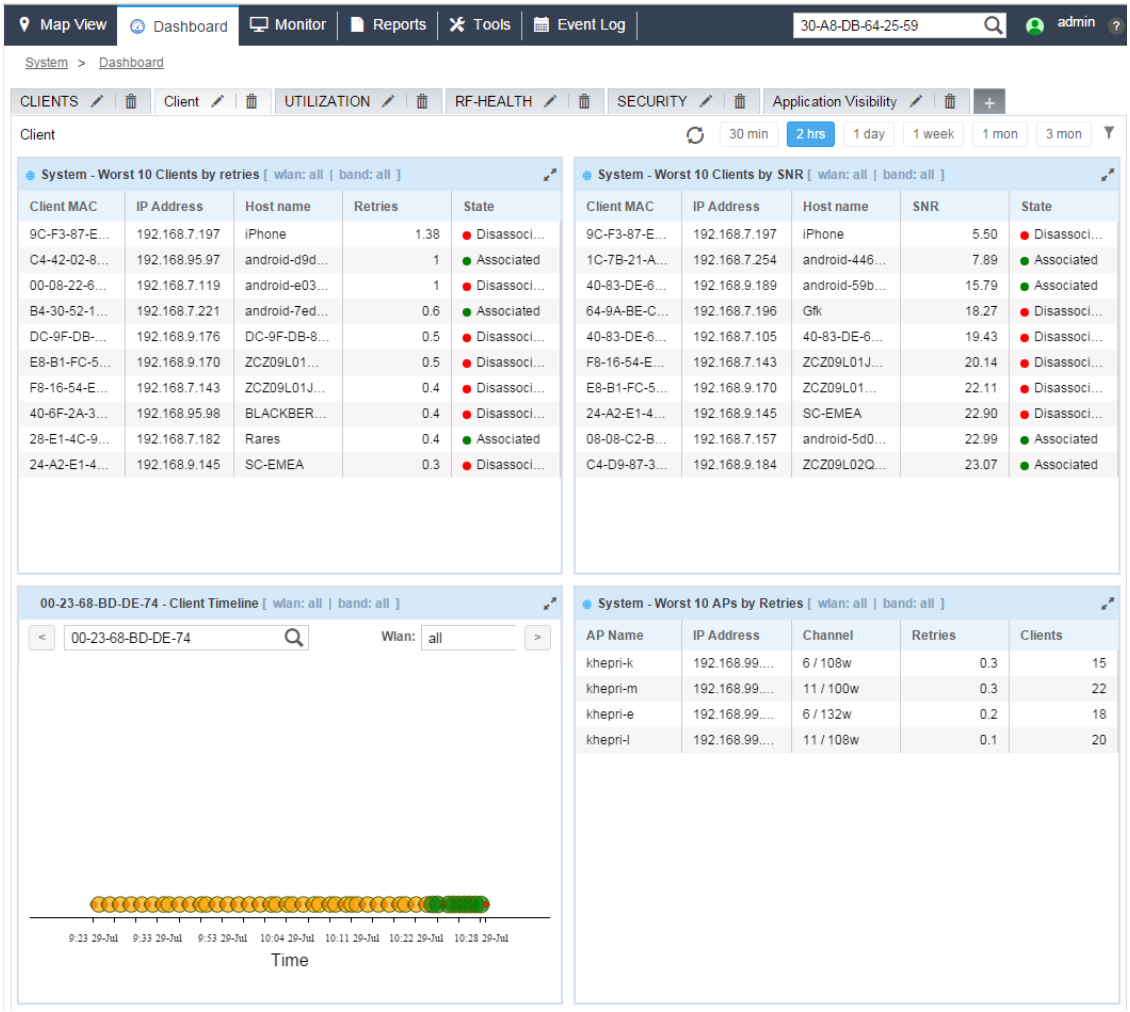
HOW TO ADDRESS CLIENT ROAMING ISSUES USING NSIGHT APPROACH

1. Identify the location where the problem has been reported, i.e. site, building, floor, etc. Check overall RF performance at the specified location; attempt to find any clues to what might look abnormal. This is needed to isolate the issue to a particular client or location where all clients are experiencing similar issues.

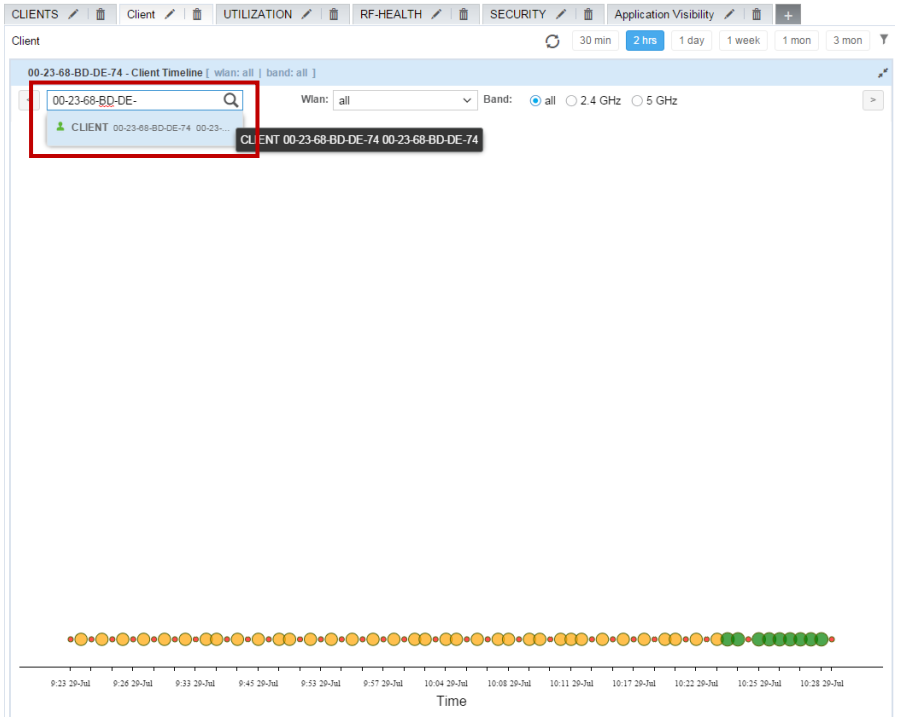
   Confirm that users are using correct SSID, are assigned to a correct VLAN, etc (see example #1 for further reference).

2. Drill down to the Floor Map view of the second floor and verify that there is enough coverage and SNR level is sufficient (i.e. > 25 dB).

3. If overall RF Health at the site looks ok then build customized dashboard that will include Client Timeline and a table showing worst 10 clients by retries and worst 10 APs by retries. This should give you overall idea where you should start looking for potential root cause:



4. Look for excessive roaming in the client timeline, i.e. if you see that the user is roaming too often or constantly associating / disassociating to the same AP during short time period. Zoom into the client timeline widget. Start typing client's MAC address and use Search button to auto-complete:

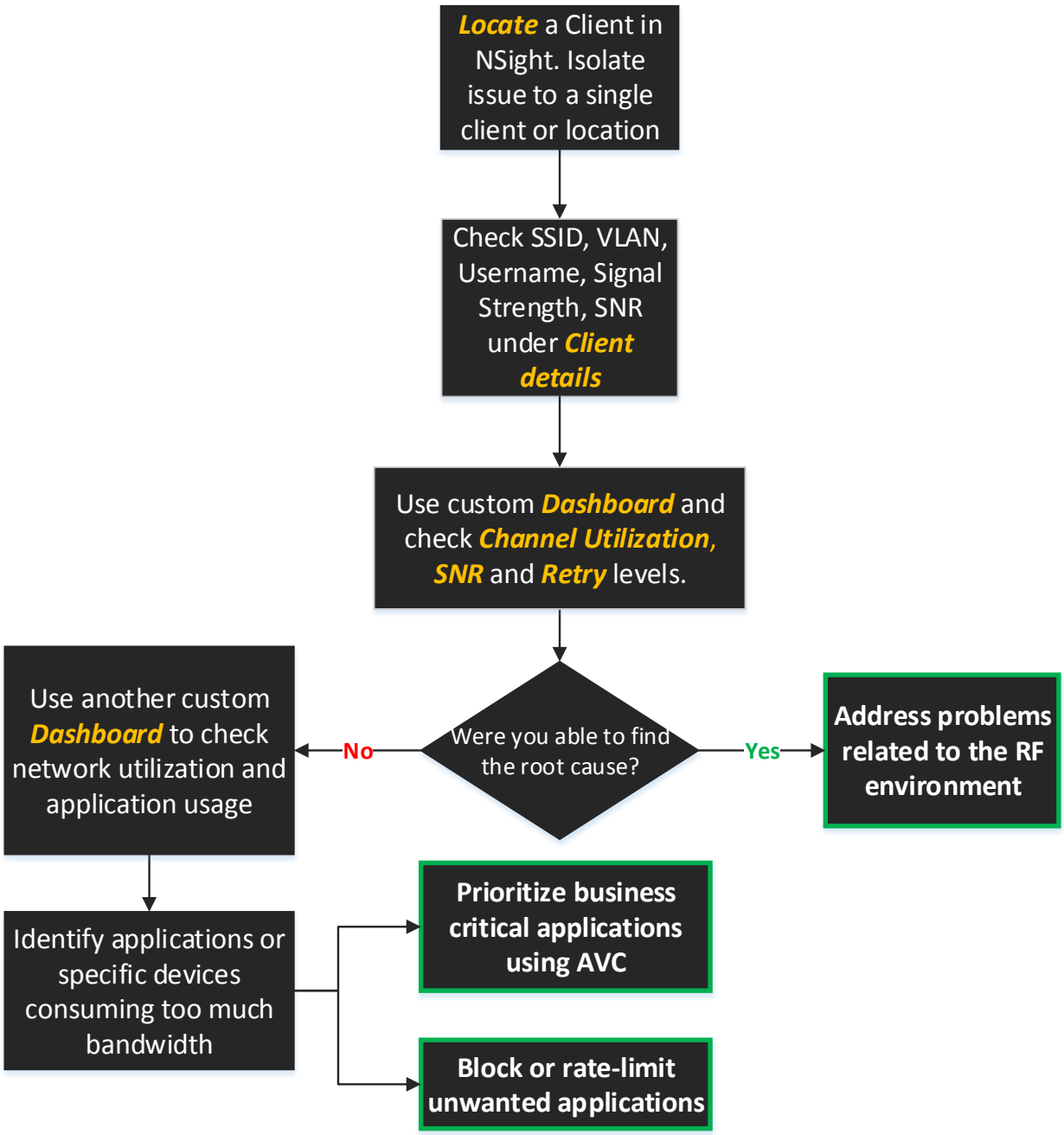


5. If the above is confirmed and you have identified trouble client(s) run a remote debug wireless and a packet capture filtering by client's MAC address, then send capture and logs for analysis to the network operations team. Wireless debug log and packet capture with show exactly where communication is failing or what could explain excessive roaming events. This has to be captured live, while the problem is happening in order to obtain relevant data.

CLIENT TROUBLESHOOTING WORKFLOW – EXAMPLE 3

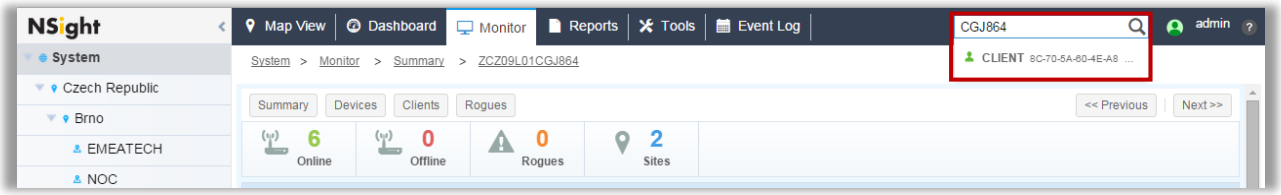
Problem: Poor network performance or "Your wireless is slow".

How to address network performance issues using NSight – Flowchart

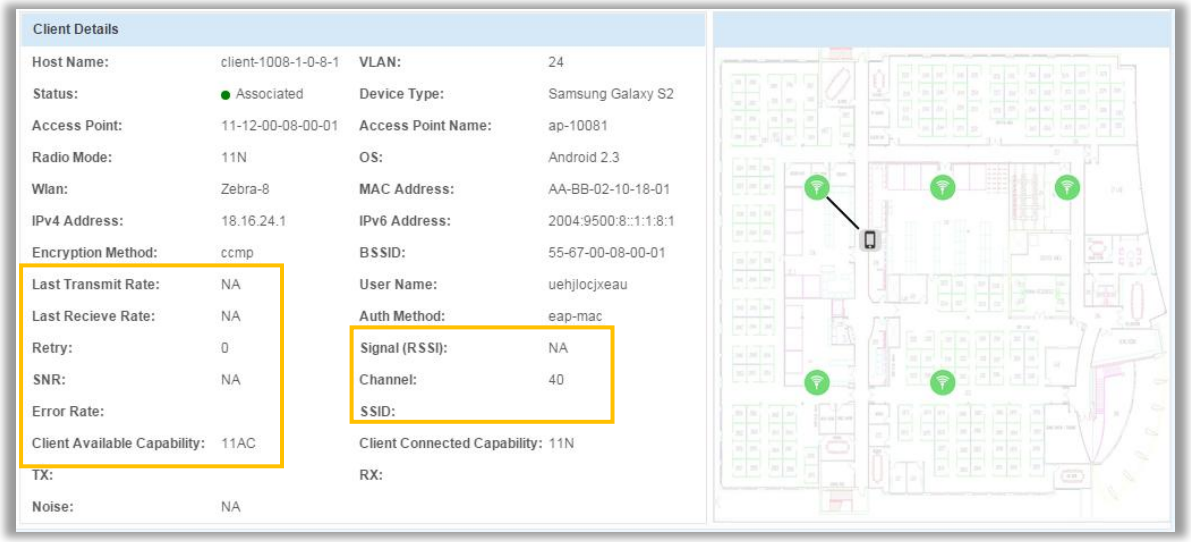


HOW TO ADDRESS NETWORK PERFORMANCE ISSUES USING NSIGHT APPROACH

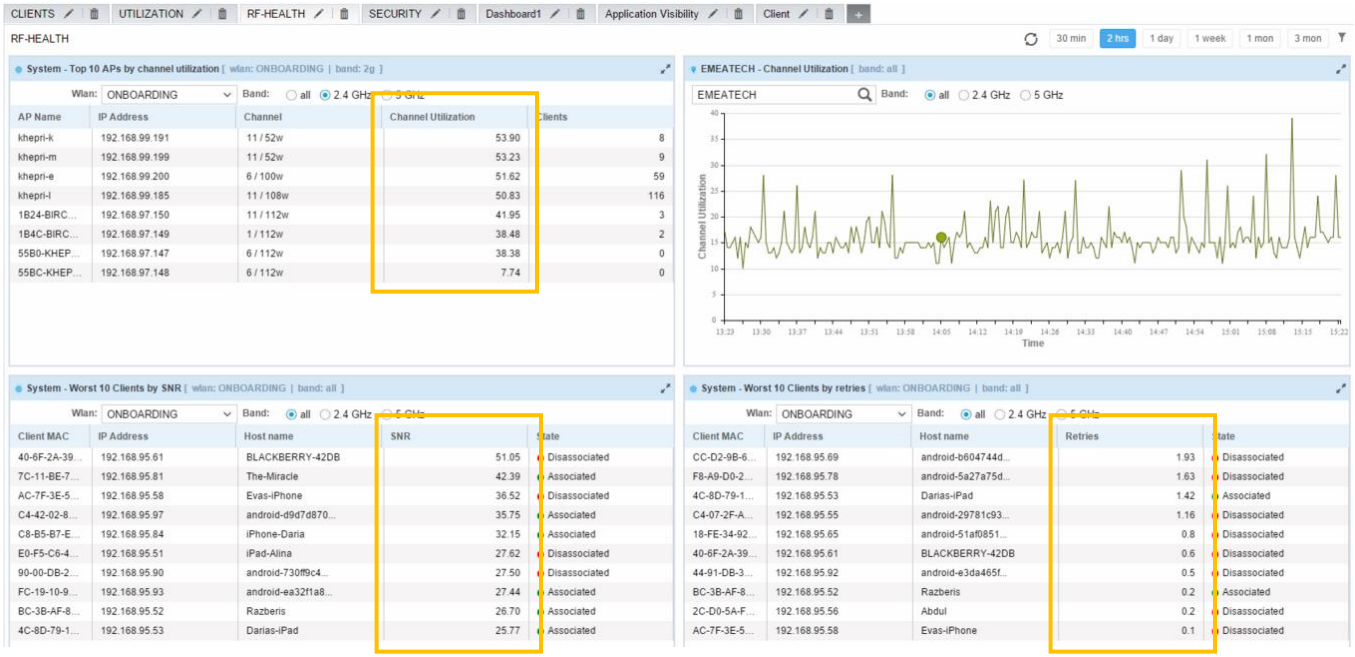
1. Identify location and user MAC address by asking the user and confirm it in NSight. The easiest way to find a client is by searching for its MAC address or part of the Hostname in the upper right corner of the UI:



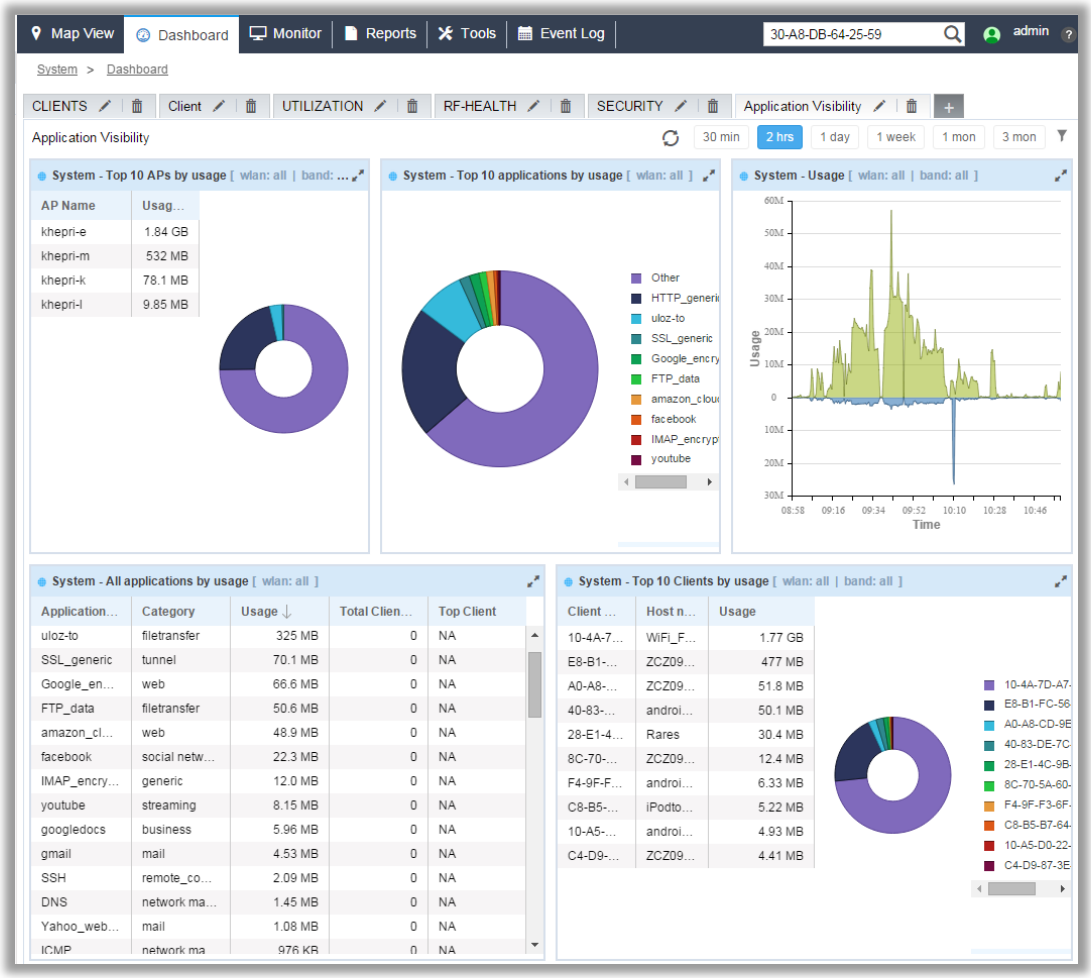
2. After finding the client in NSight click on it and you will be redirected to the client view showing you all the details regarding this particular user. This is real-time information. *Confirm that client has sufficient Signal Strength as seen by the Access Point (typically not less than -67dBm), good SNR (>25dB), low retry rate, also check Tx and Rx data rates last achieved by the client.*



3. If the above checks out and nothing stands out as odd, take a look at the RF Health at the whole site where the issue has been reported. Check specifically the band wireless client was using (i.e. 2.4Ghz or 5Ghz). Create customized dashboard under 'Dashboard' tab for this purpose and make it publicly available. Often over utilized channel (too many APs or too many neighboring networks on the same channel) will result in highly degraded performance. *Note: Always use filters to get relevant information based on when the issues has been reported. Available filters are: Time / WLAN / Band*



4. After confirming that RF is not a problem, i.e. client has good SNR, high data-rate, AP is not over utilized etc (or if RF environment is not healthy investigate RF-side issues), create another custom Dashboard showing network utilization and application usage. This will help accessing network side issues that might be the cause of poor performance:



5. Identify if there are any applications that are consuming huge amount of bandwidth. If they are not business critical apps you should make a decision to either block or rate-limit them. Identify which applications should have a priority and create a set of rules in the Application Policy giving a priority to these apps and optionally shape the traffic.

Brno - All applications by usage [wlan: all]

Application...	Category	Usage ↓	Total Clients
youtube	streaming	155 MB	
HTTP_generic	web	44.8 MB	
SSL_generic	tunnel	30.3 MB	
HTTP_media	web	10.7 MB	
FLASH	streaming	5.44 MB	
IMAP_encry...	generic	3.15 MB	
Google_en...	web	2.83 MB	
facebook	social networking	1.88 MB	
gmail	mail	1.08 MB	
DNS	network management	723 KB	
Lync_unkn...	business	692 KB	
ICMP	network management	322 KB	

[1] Application Visibility and Control is supported only on certain Access Points and Controllers. Please refer to the AVC tech brief for further details.

6. Lastly create a Security dashboard and look for WIPS alerts if any: