TRIAX EoC Pre-Qualification Guide

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1.0 Schematics	
1.1 Acquire schematics	Possible Issue: Unidentified components & possible limitations are not identified before the 1st site visit. Action: Acquire an existing schematics of the site (if any exists).
1.2 Verify schematics	Possible Issue: Unidentified expansions & updates not identified. Action: Onsite comparison is recommended since the coax network often is drawn upon creation & not updated when expanded or updated.
1.3 Need for segmentation?	Possible Issue: Not noting the topology of the installation will raise questions during the installation. Will there be a need for segmentation of the coax or port bundling? This is also dependant on the expectations on the WLAN coverage. WLAN coverage is a product of the installed endpoints. Therefore is it necessary to have an overview of the number of rooms, public areas, dead spots or other? Action: Consider if you need to segment the coax network. How many endpoints do you need?
1.4 Document in DOL/AND or other	Possible Issue: Unidentified signal level issues (forecasted), missing documentation in the future expansion of coax. Action: Document it in DOL, AND or other software & verify signals, segmentation & endpoint deployment.

2.0 Power and earthing	
2.1 Power outlet for the controller	Possible Issue: Installing an additional power outlet or power distributor. Action: Is there free power outlets for the controller(s)
2.2 Power outlet for all endpoints	Possible Issue: Installing an additional power outlet or power distributor. Action: Is there free power outlets for all endpoints.
2.3 Earthing	Possible Issue: Interference on TV/EoC signalling. Action: Earthing must be done accordingly to the specific site and locale regulations. Please verify this is possible on site.

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3.0 Ensure the Return Path

3.1 Amplifiers with no return path	**Possible Issue: EPC installed after amplifier will not work** **Action: Bypass amplifier with return path filter.**
3.2 Amplifiers with return path	**Possible Issue: Limited return path (5...65MHz). ~480Mbit/s as UDP traffic** **Action: Bypass amplifier with return path filter.**
3.3 Amplifiers with active return path	**Possible Issue: Noise in the 5...65MHz range will be amplified, that might cause interference & reduction in bandwidth.** **Action: Bypass amplifier with return path filter & deactivate return path amplification.**
3.4 Amplifiers lids	**Possible Issue: Ingress/noise generated by the amplifier, that might cause interference & reduction in bandwidth.** **Action: Tighten all amplifier lids.**
3.5 Amplifier resources	**Possible Issue: Too low signal level on TV services, after added passive components/filters/EoC system, if the amplifiers already are set to max gain.** **Action: Make sure, that the added attenuation can de be compensated by the amplifiers.**
3.6 Splitters & Taps	**Possible Issue: Defective splitters & taps may cause loss/ingress on the G.hn. The TV services might work due to capacitive coupling.** **Action: Replace defective splitters & taps, when identified.**
3.7 Connectors	**Possible Issue: Twist-on or poor mounted press-on connectors may cause ingress/noise.** **Action: Replace connectors if the Ingress/noise is severed.**
3.8 Combining EoC & TV	**Possible Issue: Interference, Tuner overload, too much attenuation added Taking into account the channel plan, current end-to-end attenuation** **Action: Use the TV-in on the controller. If it is needed to bypass the controller, use the return path filter for combining.**
3.9 Outlet with an endpoint	**Possible Issue: Limited bandwidth due to frequency specifications on the outlet.** **Action: Replace the outlet to support for full bandwidth.**
3.10 Outlet without an endpoint	**Possible Issue: Overload on TV/STB due to high EoC signal level from neighbouring EPC.** **Action: Add a filter in front of the TV/STB to remove interference.**
3.11 Connection between coax & outlet	**Possible Issue: Poor connection may cause ingress/noise. To narrow bending radius may decrease return loss & result in a reduction of amplitude in a frequency range.** **Action: Correct the coax/outlet connection accordingly to specifications.**

4.0 Frequency plan

4.1 Locally generated services	Possible Issue: **Interference on both EoC & radio/TV services.** Action: **Reallocate TV services to a high-frequency range.**
4.2 ISP delivered services	Possible Issue: : **Interference on both EoC & radio/TV services. This scenario can also introduce issues like DOCSIS 3.1 return path signalling (0..204MHz), which lies in the same frequency range as the EoC signalling. In this scenario, it is demanded to install a highpass filter in the delivery point of the ISP.** Action: **Ideally install a headend or filter out incoming interfering signals & notch out EoC if needed.**
4.3 Injection of TV services through the EoC system	Possible Issue: **limits the usage of frequencies for TV services to the range 300..862MHz. The advantage is, that the separation of EoC & TV services is done by built-in filters on the controller & EPC's.** Action: **This will introduce some additional attenuation to the TV signal, that must be compensated before injection. The additional attenuation depends on the type of controller being used.**
4.4 Combining of TV services parallel to the EoC system	Possible Issue: **Using passive components increases attenuation. Possible interference, if TV services are to close to EoC signalling.** Action: **Use a return path filter for each EoC port in use. The frequency range for TV services is 300..862MHz. Attenuation is reduced to 1.5dB for the TV signal, compared with passive components. But the TV signal must still be splitted out, introducing attenuation. Therefore will the advantage of parallel combining be reduced.**
4.5 Measure/check signal levels	Possible Issue: **TV services may stop working on individual TV/STB due too to low signal levels. Especially in the high-frequency area, that is more sensitive to attenuation.** Action: **Measuring the level of the TV signal at each TV/STB is highly recommended, to verify that the signal level is high enough, giving headroom for the added attenuation (depending on added passive components/outlet etc.). See *'3.5 Amplifier resources'* for further information.**

5.0 IP survey	
5.1 Router	Possible Issue: Needed demand is not meet. The router must be replaced Action: What kind of router is installed? Does it support the needed requirements like? See bullet *'5.6 DHCP, NAT, Firewall & VPN'*.
5.2 Switches	Possible Issue: Removing and/or replacing switches Action: Is there already installed switches? Do they need to be replaced to meet the needed requirements? See bullets below. Do they need to be removed entirely due to system replacement?
5.3 Access points	Possible Issue: Multiple systems running parallel. Mixed setup. Action: Is there any access points already installed. Do they need to be removed?
5.4 Existing VLANs	Possible Issue: VLAN ID mismatch or missing VLANs Action: Get an overview of what is needed. Usually, you will need 1 VLAN for every WLAN (SSID) and 1 VLAN for management. Is there already VLANs configured on the site router and switches? Is it required to have client isolation on 1 or more VLANs?
5.5 IP Scopes	Possible Issue: Missing IP scopes for connected clients, resulting in no internet access. Action: Again, get an overview of what is needed. 1 IP scope pr VLAN is normal. Management VLAN usually don't have a DHCP server connected but will use static IP addresses in a fixed and already defined IP scope.
5.6 DCHP, NAT, firewall & VPN	Possible Issue: Missing IP addresses for connected clients, resulting in no internet access. Action: Will the onsite router handle the IP address assignment, NAT and security? Is it necessary to replace the router, for supporting multiple VLANs and IP scopes? Does the router give VPN opportunity?
5.7 Management & remote access	Possible Issue: Missing option to access and manage the system remotely. Action: Setup management to the controller from a specific VLAN and setup VPN preferable over port forwarding.

6.0 WLAN & Site survey

6.1 Does the site owner know the current situation	**Possible Issue: The EoC installation will end up not covering the desired needs for full WiFi coverage and experience.** **Action: Talk with staff/everyday users to clarify their needs. The 'staff' get the complaints and knows the current limitations of the actual installation.**
6.2 Network requirements	**Possible Issue: May result in a network with limited throughput and coverage.** **Action: Make an estimate on the usage in peak hours. Remember, the internet connection into the installation (potential bottleneck).**
6.3 Expected coverage	**Possible Issue: Deadspots or areas with a poor WLAN connection. May result in reduced speed on individual endpoints (air time usage).** **Action: Make sure, that site owner understands the need for additional endpoints, to ensure the coverage, if this is needed.**
6.4 Building materials	**Possible Issue: Poor WLAN propagation & deterioration in some areas, due to high-density building or shielding materials.** **Action: Visually inspection can give an experienced installer an idea of the needed endpoint deployment. If in doubt complete a site survey/heatmap.**
6.5 Interference	**Possible Issue: Poor WLAN propagation & deterioration in some areas, due to interference on mostly 2.4GHz & 5GHz.** **Action: Locate/identify none-WLAN transmitting sources like 2.4GHz transmitters, microwave ovens etc.**
6.6 Existing WLANs & SSID	**Possible Issue: Interference & confusement on utilized SSID (the origin).** **Action: Distinct clearly between SSIDs if 2 systems are needed. Reduce interference by utilizing the correct channels on both 2.4GHz & 5GHz.**
6.7 Future plans for the site	**Possible Issue: Any reconstruction or changes to the site can have an impact on the finished installation.** **Action: If there any future plan in reconstructing/expanding/repairing the site or part of the site, take into consideration these plans or aware the client of the effect of these plans.**