Motivation:

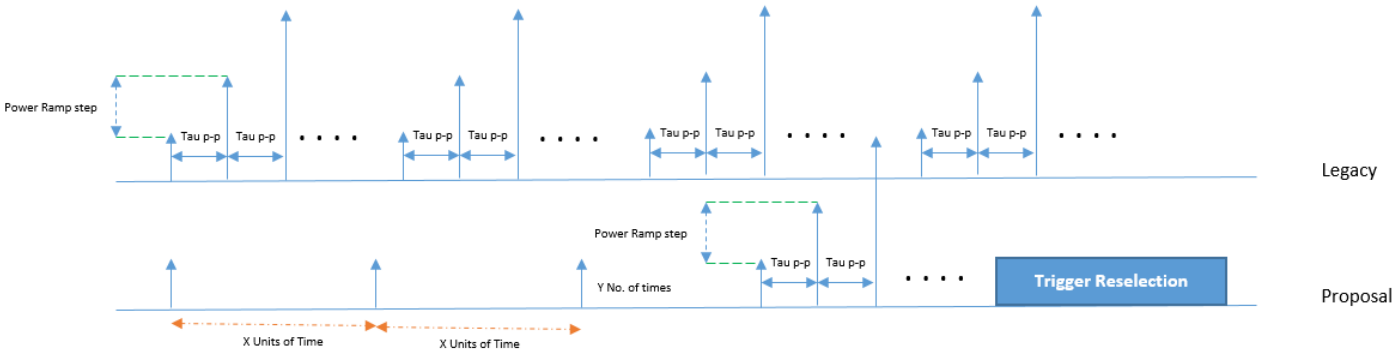
- Within few years from now, there will be millions of the data spouting devices/sensors which are going to be connected to the internet such as temperature sensor, humidity/Moisture sensor, motion/velocity sensor, leaks/levels sensors etc. This will collectively form a WSN.
- Most of these IoT devices are static in nature and needs to transmit only bursty non-time critical data.
- Due to temporary high UL interference or over reaching at that location, the device must be spent more power in transmitting the non-critical data or to access the NW.

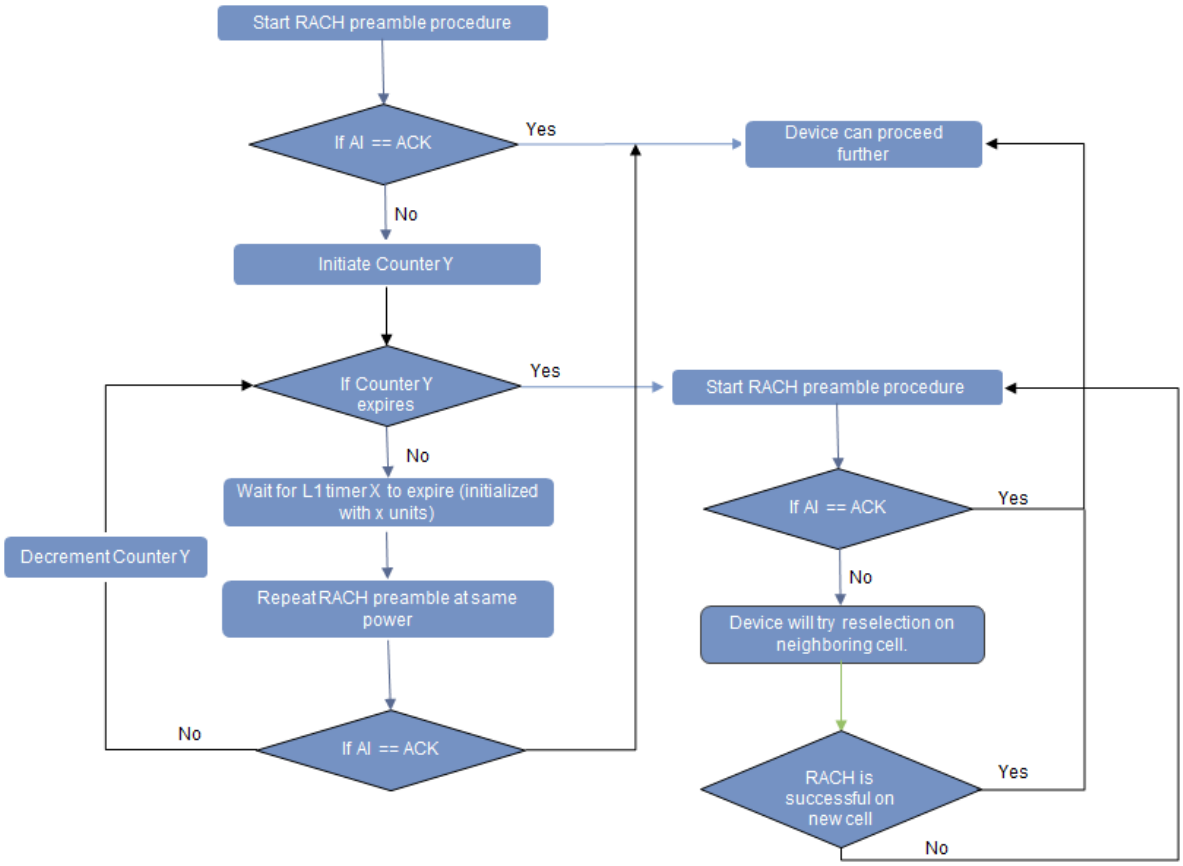
Problem Discussed:

- Most of these IoT devices are static in nature and needs to transmit only bursty data.
- Due to tentative/temporary high UL interference or over reaching at that location, the device has to be spend more power in transmitting the non-critical data or it can take long time for device to access the NW even though some better weak cell is available in its vicinity.
- Though device will attempt RACH always on the strong cell, due to overreaching or temporary higher UL interference, RACH preamble may not be ACKed by the NW sooner (at the same power where it was ACK-ed previously) and proceed with ramping up the power for successive preamble attempts as per the standard/Spec or there can be the case where device got the AICH ACK for the preamble transmissions but RACH MSG or RRC connection request is not reaching the network. These multiple preamble attempts with increased power will cause large power consumption for IOT devices.
- Since the devices are static in nature, they may try the RACH attempt on the same cell.
- According to current 3GPP specs, there will not be any trigger for reselection in good downlink conditions.

Algorithm:

1. Upon Detecting unsuccessful preamble transmission for non-critical data transmission (like temp./moisture/leak/level sensor data) which are prominently used in WSN, PHY layer backs-off for X-units of time for successive preamble attempts.
    - ✓ *Where X >= Tau p-p (Time between successive preamble transmission)*
2. After timer X expires, PHY layer repeats RACH preambles at the same power as per the preamble power history. Repeat the above steps till RACH is successful for Y number of times.
    - ✓ *Where Y <= No. of Preambles configured*
3. If still RACH is unsuccessful, fallback to legacy RACH procedure.
4. Upon further RACH failures, device will try to perform reselection on the neighboring cell, even if DL conditions are good at the serving cell.
5. Device will fallback to the previous cell, if RACH fails on the neighboring cell.





Advantages:

1. It will reduce power consumption as multiple RACH attempts will be avoided. Also, successive preambles will be transmitted at lower power (It will help in keeping IoT devices at low power).
2. Reduces the latency in connection It will reduce the UL interference (RoT) in the network as unnecessary preamble transmissions at high power are avoided.
3. establishment procedure.