Neighbor Discovery using Interference Free Coexistence Time Slot

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Facilitate the 802.16 LE standard, annex for C802.16h-05/019

Neighbor Discovery using Interference Free Coexistence Time Slot

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Proposal Synopsis

- A simple Method for Neighbor Discovery
  1. Initializing BS send the address to the reachable subscribers belong to the operation neighbors.
  2. The subscribers report the message to the operation BSs that they registered to.
  3. Operation neighbors will find the initializing one in the IP network.

Working Doc Introductions

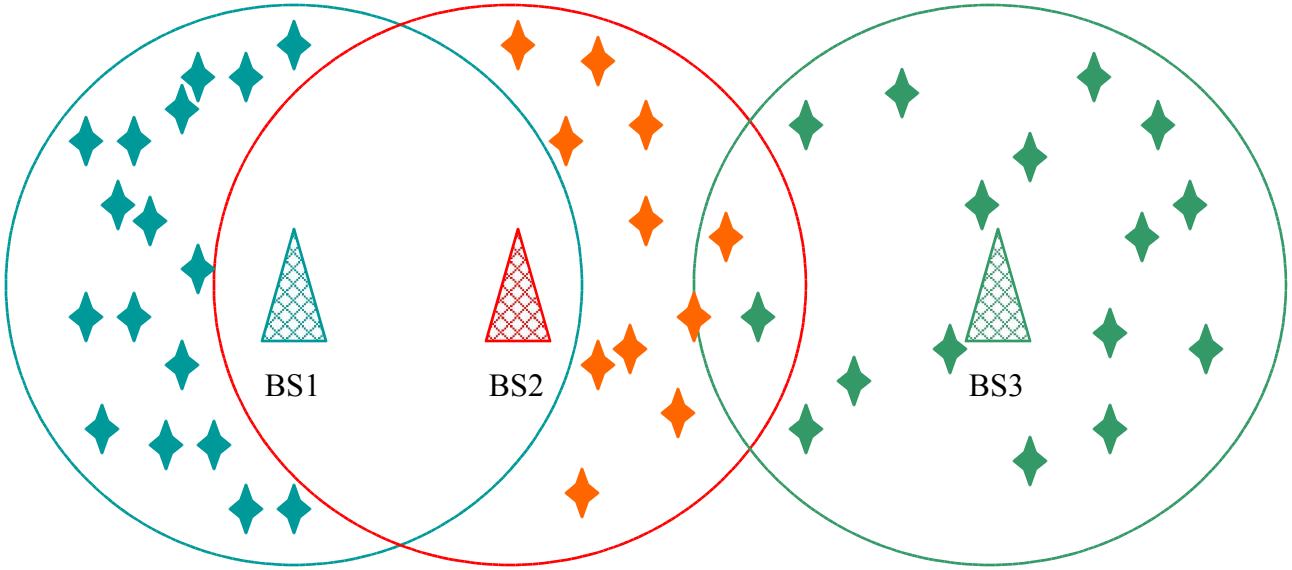
- **2.1.1.1 General Principles**
  - All the Base Stations forming a community will have synchronized MAC frames
- **2.1.2.2 Inter-network communication**
  - Base Station to/from Subscriber Station to/from foreign Base Station; the subscriber Station is used as relay, if the two Base Stations are hidden one from the other
- **7.2.2.1.1 Guaranteed radio resource**
  - Every network will have a guaranteed minimum access time for the interference free use of the radio resource, being able to transmit at the needed powers for allowing communication between its Base Station and the remote subscribers; the guaranteed minimum access time will be basically the same for all the networks sharing the radio resource.

Abbreviation

- **CTS – Coexistence Time Slot**
- **IBS – Initializing Base Station**
- **OBS – Operating Base Station**

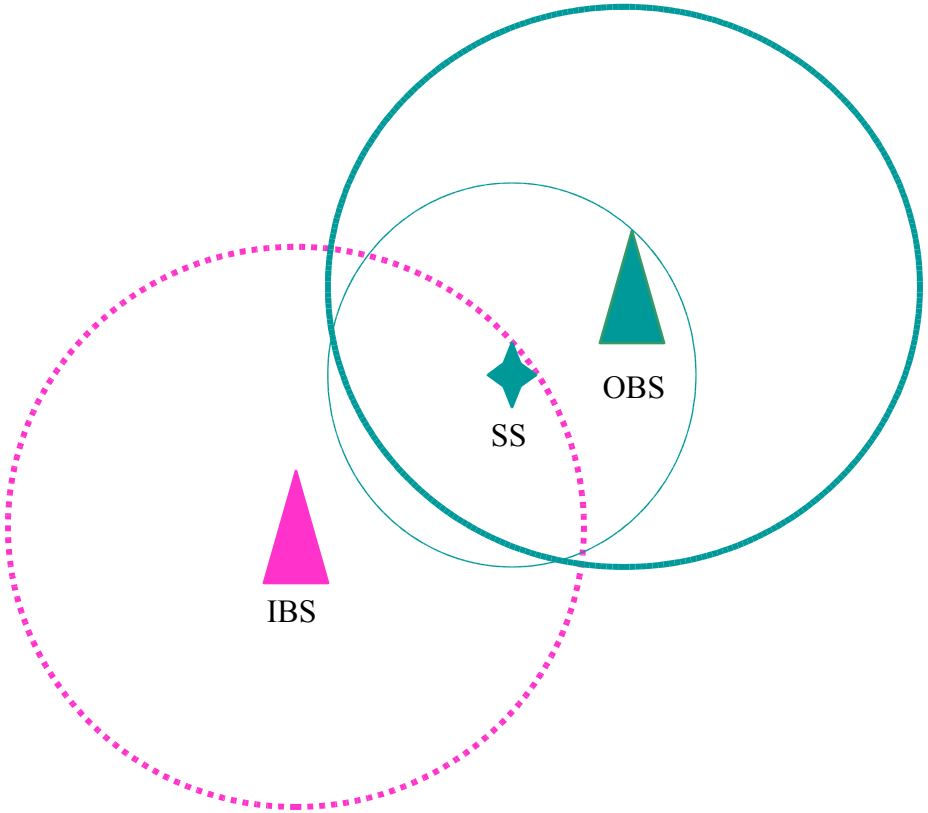
Definition of Neighbor BS

- Neighbor BSs : the base stations that have valid SSs in the common coverage area are called neighbor BSs
  - (No SS exists in common area means the BSs are not neighbor BSs, no matter if BSs could hear each other or not.)



Hidden issue in Scan

- SS may still be hidden after Initializing BS's scanning.
- IBS may cause interference to hidden SS then



Current Flow of Neighbor Discovery

2.1.1.3 Community Entry of new BS

- The first phase of the Community Entry process uses the country/region (FCC) data base:
  - o *Read the Regional/country (FCC) data base;*
  - o Identify which Base Stations might create interference, based on the location information;
  - o Learn the IP identifier for those Base Stations;
- Build the local image of the relevant information in the community BS's, *by copying the info in those BSs*
- Listen on multiple frequencies
  - o Identify the level of interference on each frequency channel;
- Decide the working frequency (ACS – Adaptive Channel Selection process);

▪▪▪▪▪▪

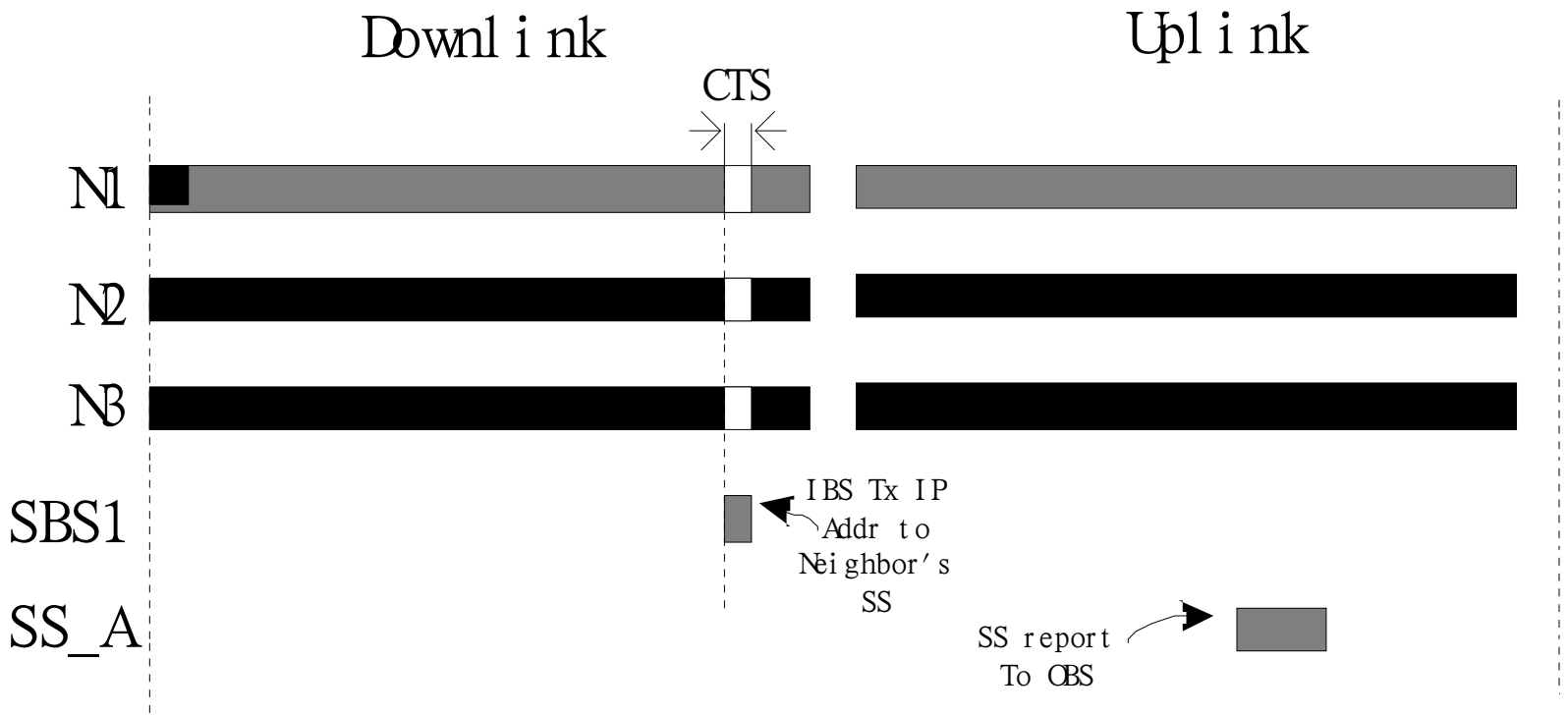
Current Issue of Neighbor Discovery

- Hidden stations problem may cause the initializing BS to make wrong choice and risk a complex negotiation afterward
- Need centralized server to find possible neighbor
  - If some BS is use the spectrum without registration to CIS , it will cause another kind of hidden stations issue

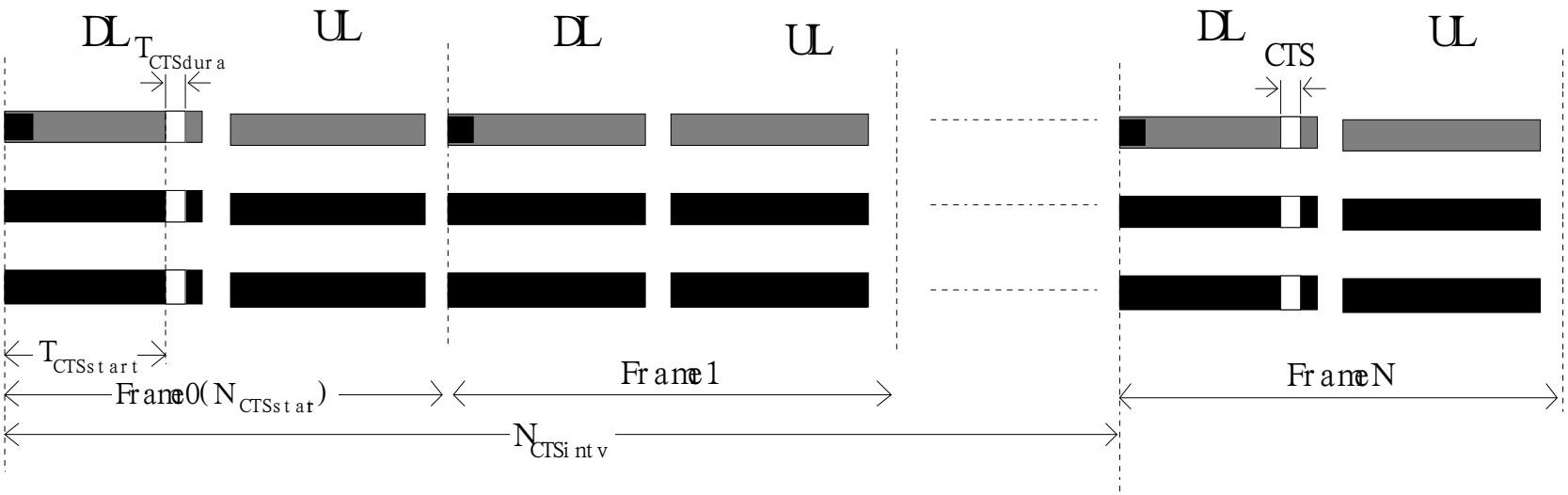
Proposal Method

- Define a CTS (Coexistence Time Slot) in downlink for the Neighbor Discovery
- All the OBS be silent in CTS
- IBS broadcast the IP address using this time slot to reachable Neighbor's SSs
  - In Maximum Power
  - Use robust modulation (common profile)
- OBS will collect the IBS's address from SSs and contact IBS in the wired network for further authentication & negotiation

Proposal Method (Frame Structure)

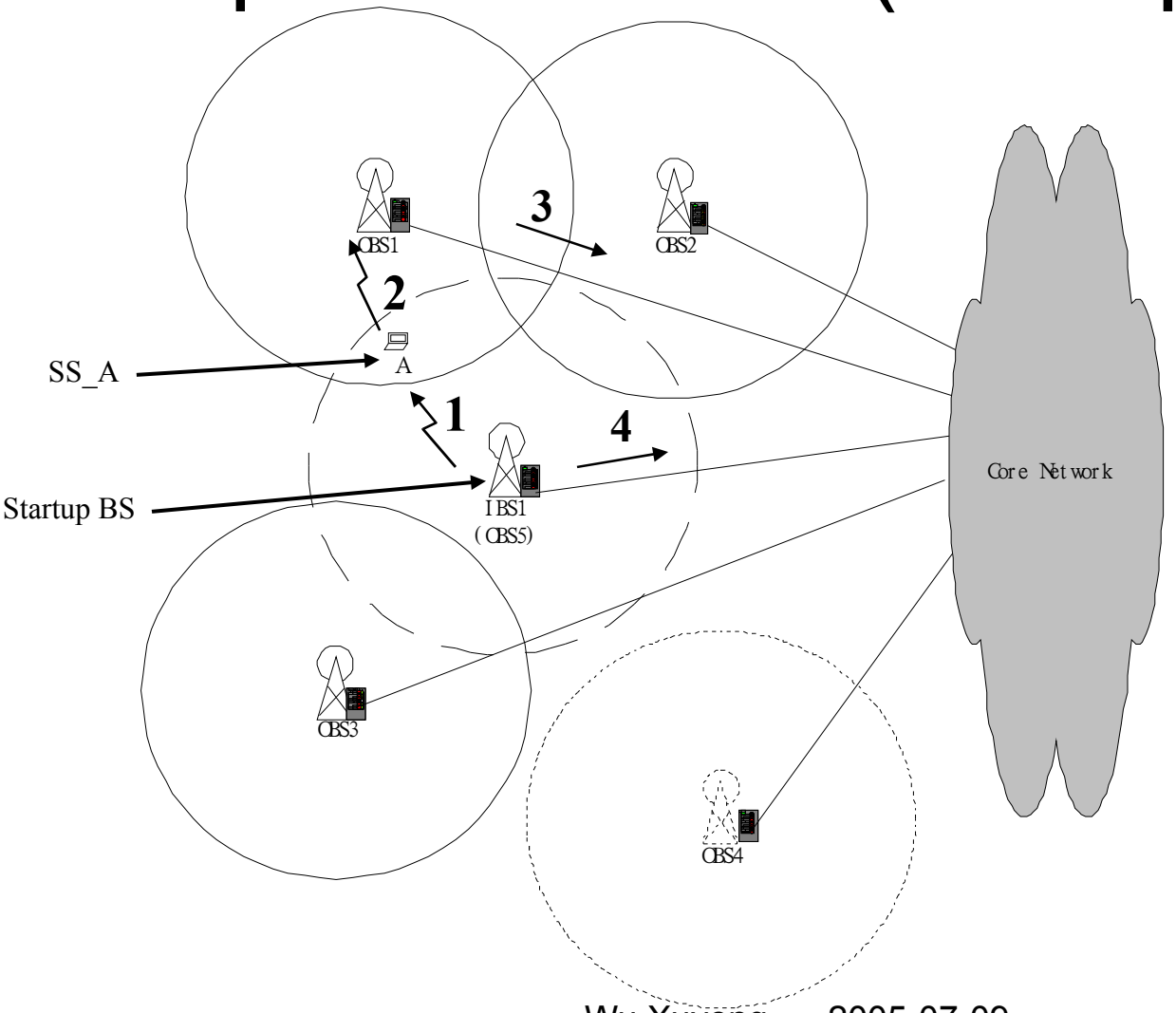


Proposal Method (parameters)

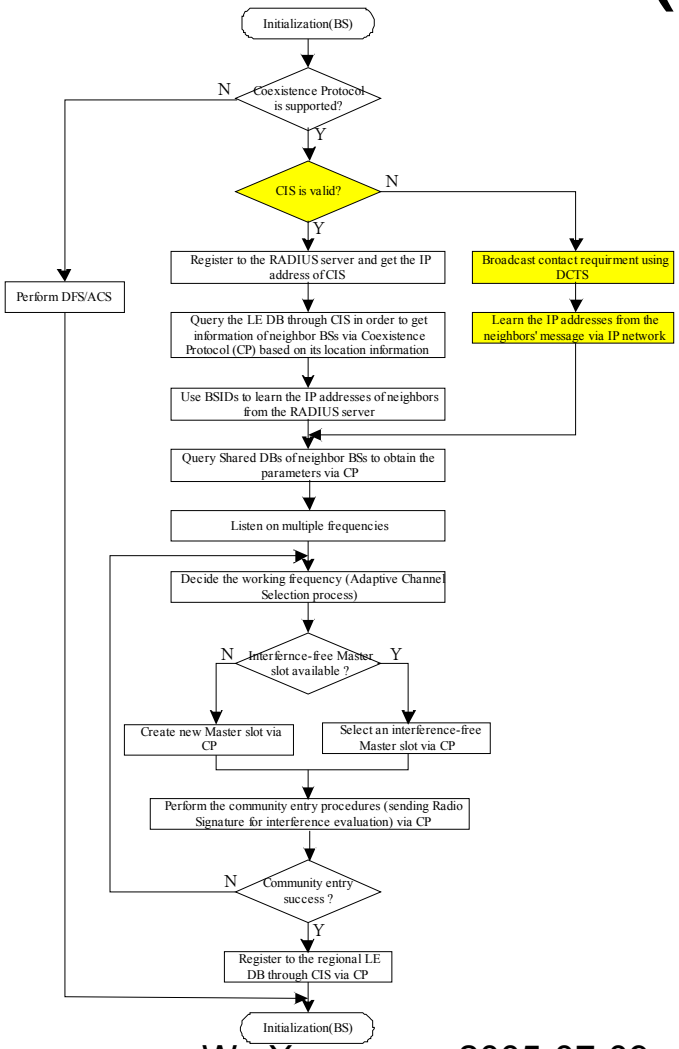


TCTSstart : *CTS starting time from the beginning of the frame(ms)*
TCTSdurat : *CTS duration time (ms)*
NCTSstart : *CTS starting frame number* （ *frames* ）
NCTSintv : *CTS interval frames* （ *frames* ）

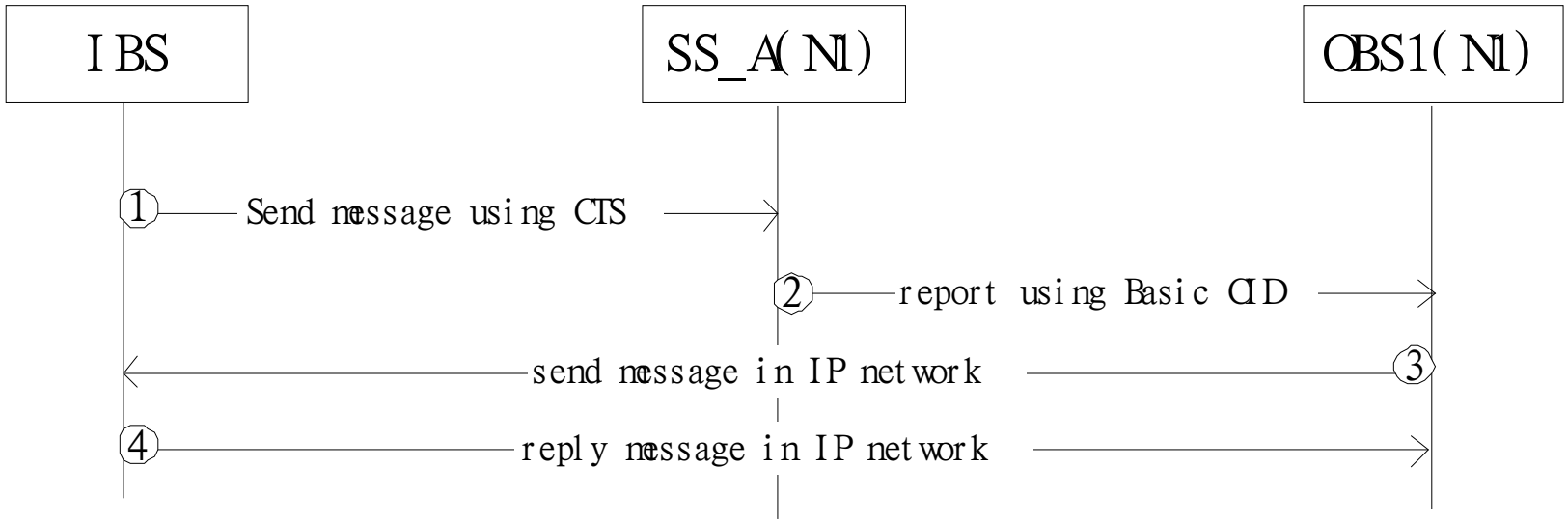
Proposal Method (Example)



Proposal Method (flow)



Proposal Method (interaction)



Benefit of using CTS for initializing

- Reduce the risk for hidden stations in initializing period
- No centralized server prerequisite for neighbor discovery purpose
- Concordant for ad-hoc community

Proposal Conclusion

1. Redefine the “neighbor” concept for coexistence protocol in working doc
2. Accept CTS & CTS parameter to be defined in doc
3. Accept the initiative method for Initializing BS as part of community entry flow

Discussion

1. A same-PHY or a common capability needed?
   - Need a predefined common coexistence communication PHY for 16 coexistence purpose ?
2. Does the IBSs need to send the contact request also in adjacent channel ?

Discussion

- Backup

Neighbor Discovery using Radio Signature?

- No slots for startup BS to communicate the operating BS or SS.
- Signature do not contain IP address
- SS signature do not contain BS address
- SS may hidden when silent or with low Tx Power