

Concept of Ranging Code Set in BWA

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Purpose: This presentation presents the concept for Ranging Code Set.

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2002. 1.

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Problems of Ranging

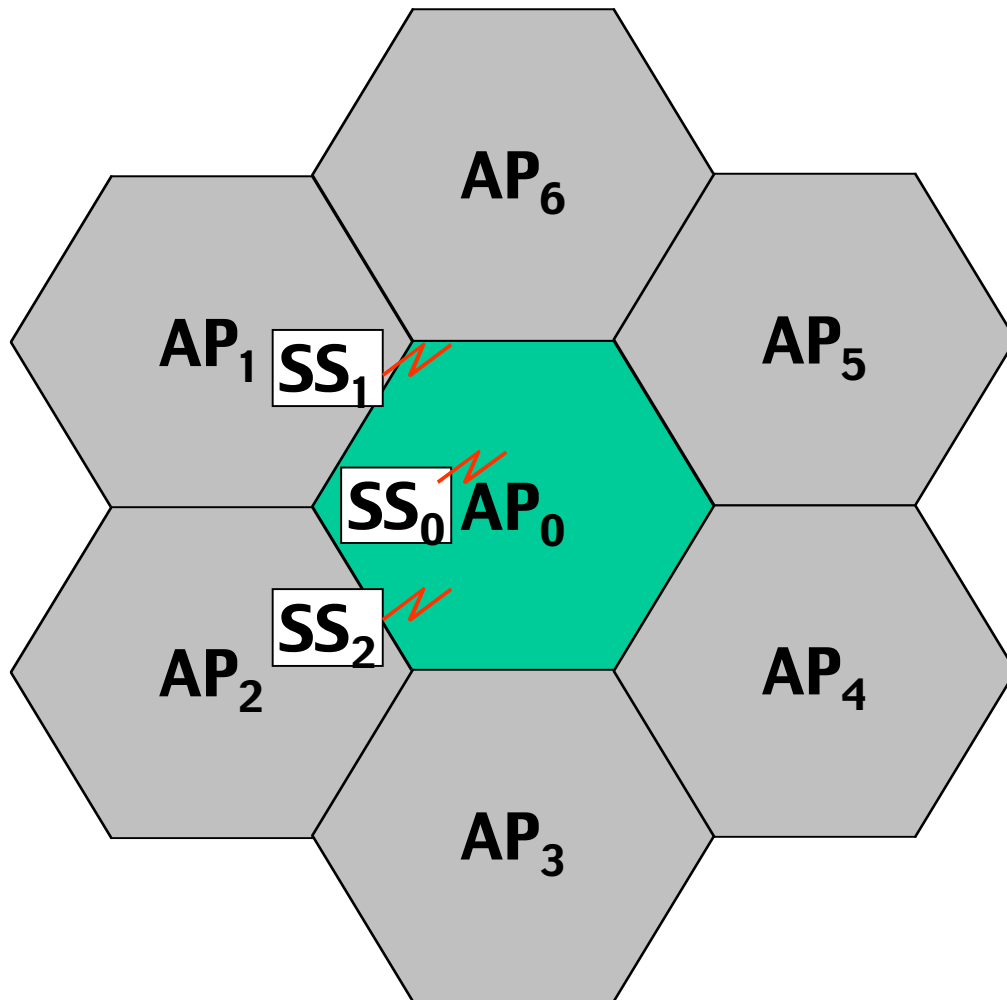
❑ Ranging Request Signal from SS

- ❖ Ranging Codes : All SSs of system use the same Ranging codes (Generating by the PRBS)
- ❖ Uncontrolled power and time offset

❑ AP s Ranging Signal Detection

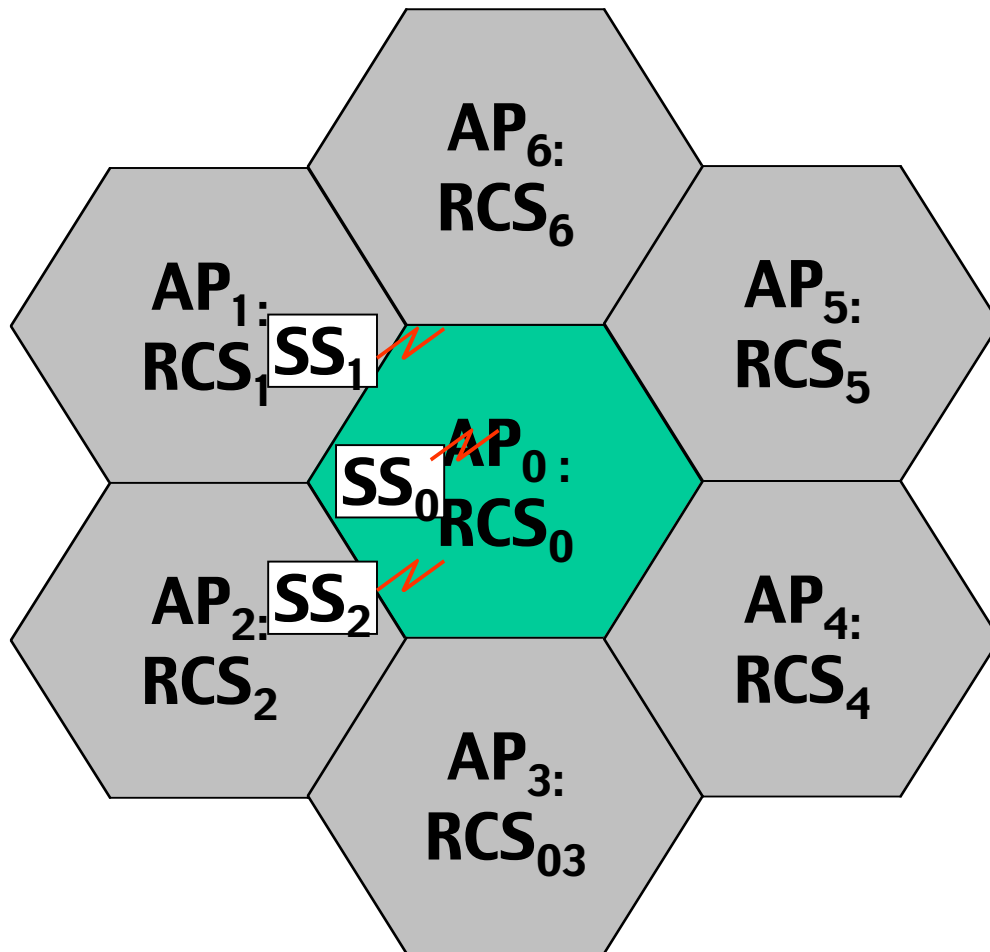
- ❖ Identifying by Ranging Code and Ranging Sub-channel
- ❖ Can t know which SS transmits the Ranging Signal
- ❖ Can t distinguishes Ranging Request Signals of own SSs from the adjacent cells s SSs

Interferences from the adjacent cells



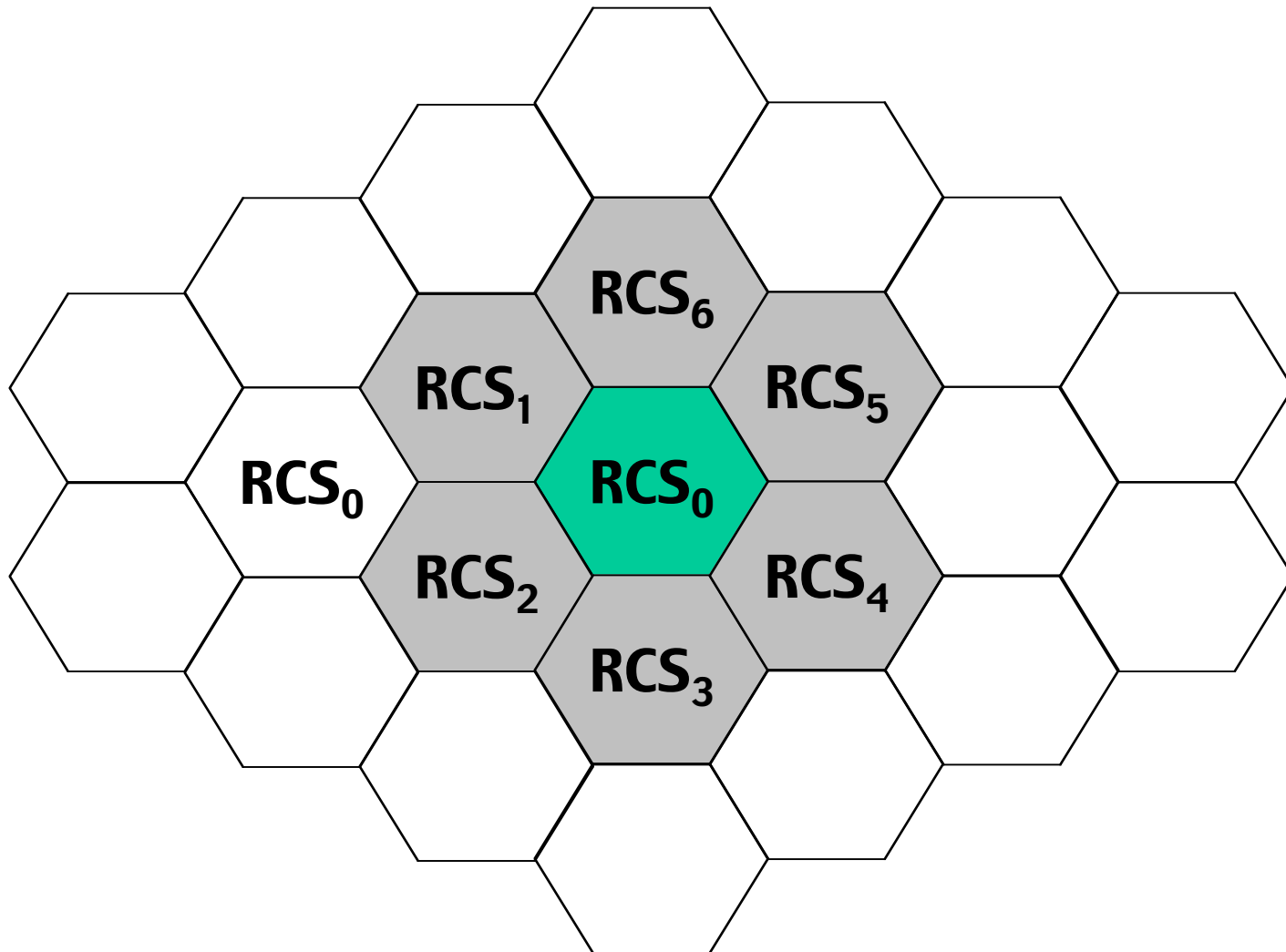
- ❑ AP₀ can receive Ranging Request Signals from SS₁ and SS₂.
- ❑ SS₀, SS₁ or SS₂ may select the same Ranging Code.
- ❑ AP₀ can't distinguish Ranging signal of SS₀ from SS₁ and SS₂.
- ❑ Ranging Request signal of SS₁ or SS₂ meets the ranging success criteria then AP₀ will send the Ranging Response signal to SS₁ or SS₂.
- ❑ The probability of ranging success goes down.

Using the different Ranging Codes



- ❑ Each cell uses the different Ranging Codes; Ranging Code Set (RCS)
- ❑ AP_0 detects the Ranging Request Signals using only RCS_0 .
 - ❖ AP_0 can prevent the Ranging Request Signals from SS_1, SS_2 .

Assignment of Ranging Code Set



Adaptation on IEEE802.16a

- Broadcasting RCS information through UCD message
 - ❖ Ranging Codes : Generated by the PRBS($1+X^1+X^4+X^7+X^{15}$)
 - Length of : 53 bits, The number of Ranging codes : 48
 - ❖ Ranging Code Set
 - Length of the PRBS : $2^{15}-1 = 32767$
 - Each Ranging Code Set has the 48 Ranging Codes.
 - The number of Ranging Code Set is 12.
- Add Ranging Code Set index element to UCD message.

Updated UCD message

Syntax	Size	Notes
UCD_Message_Format() {	◦	◦
Management Message Type = 0	8 bits	◦
Uplink channel ID	8 bits	◦
Configuration Change Count	8 bits	◦
Mini-slot size	8 bits	◦
Ranging Backoff Start	8 bits	◦
Ranging Backoff End	8 bits	◦
Request Backoff Start	8 bits	◦
Request Backoff End	8 bits	◦
Ranging Code Set	4 bits	New element
TLV Encoded information for the overall channel	Variable	TLV Specific
Begin PHY Specific Section {	◦	◦
For(l=1;l<=n;l++)	◦	◦
Uplink_Burst_Profile	Variable	◦
}	◦	◦
}	◦	◦
}	◦	◦

Quasi-random Selection of Ranging Code

- ❑ To avoid the conflict of selecting the same ranging code among SSs within one cell, SS selects ranging code by following rule instead of random selection.

Ranging Code Index = {SS MAC Address} modulo {The number of Ranging Codes}

- ❑ Higher contention resolution adding one step for selecting Ranging code
- ❑ Prevent the delay of back off cause of confliction

Summary

□ Using Ranging Code Set

- ❖ Avoid the Ranging Request Signal from the adjacent cells.
- ❖ Simple implementation
 - Only addition one element to UCD message
- ❖ Increasing of Ranging Success probability

□ Quasi-random Selection of Ranging Code

- ❖ To avoid the selection of the same Ranging code within one cell
- ❖ Higher contention resolution of selecting Ranging Code
- ❖ Can prevent the delay of backoff