

Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [Frame Synchronization to Combat In/Out Interference in WBAN]

Date Submitted: [19 March 2008]

Source: [S. M. Ryu, T. H. Kim, D. Y. Kim, C. S. Eun] Company [Casuh, Inc., Chungnam Nat'l Univ.]

Address [813 Leaders Building, 342-1 Yatap-dong, Bundang-gu, Seongnam, Gyeonggi-do 463-070, Korea]

Address [220 Yuseong-gu, Gung-dong, Daejeon, Korea]

Voice: [+82-31-709-5577, +82-42-821-6862], FAX: [+82-31-709-5578, +82-42-823-5586]

E-Mail:[retaw@casuh.com, dykim@cnu.kr]

Re: [Contribution to IEEE 802.15.6 Meeting, March 2008]

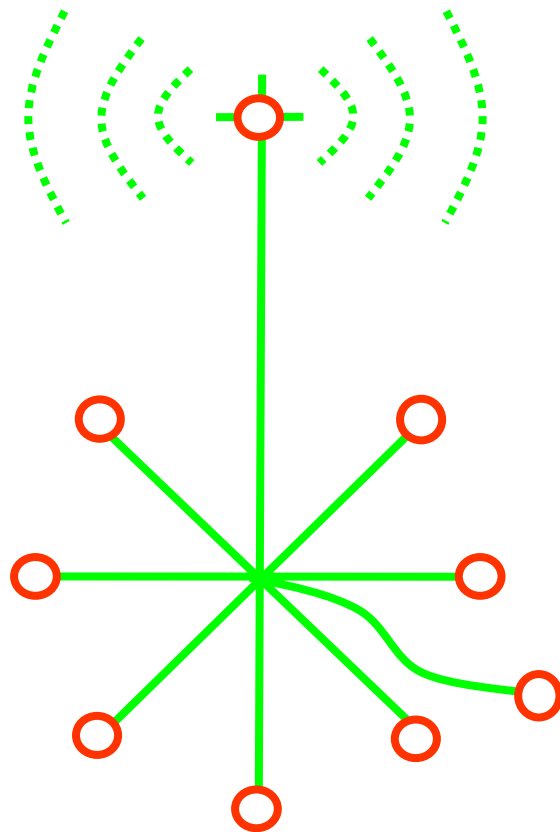
Abstract: [Propose frame synchronization method to avoid interference problems]

Purpose: [Proposal]

Notice: This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

Release: The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15.

Frame Synchronization to Combat In/Out Interference in WBAN

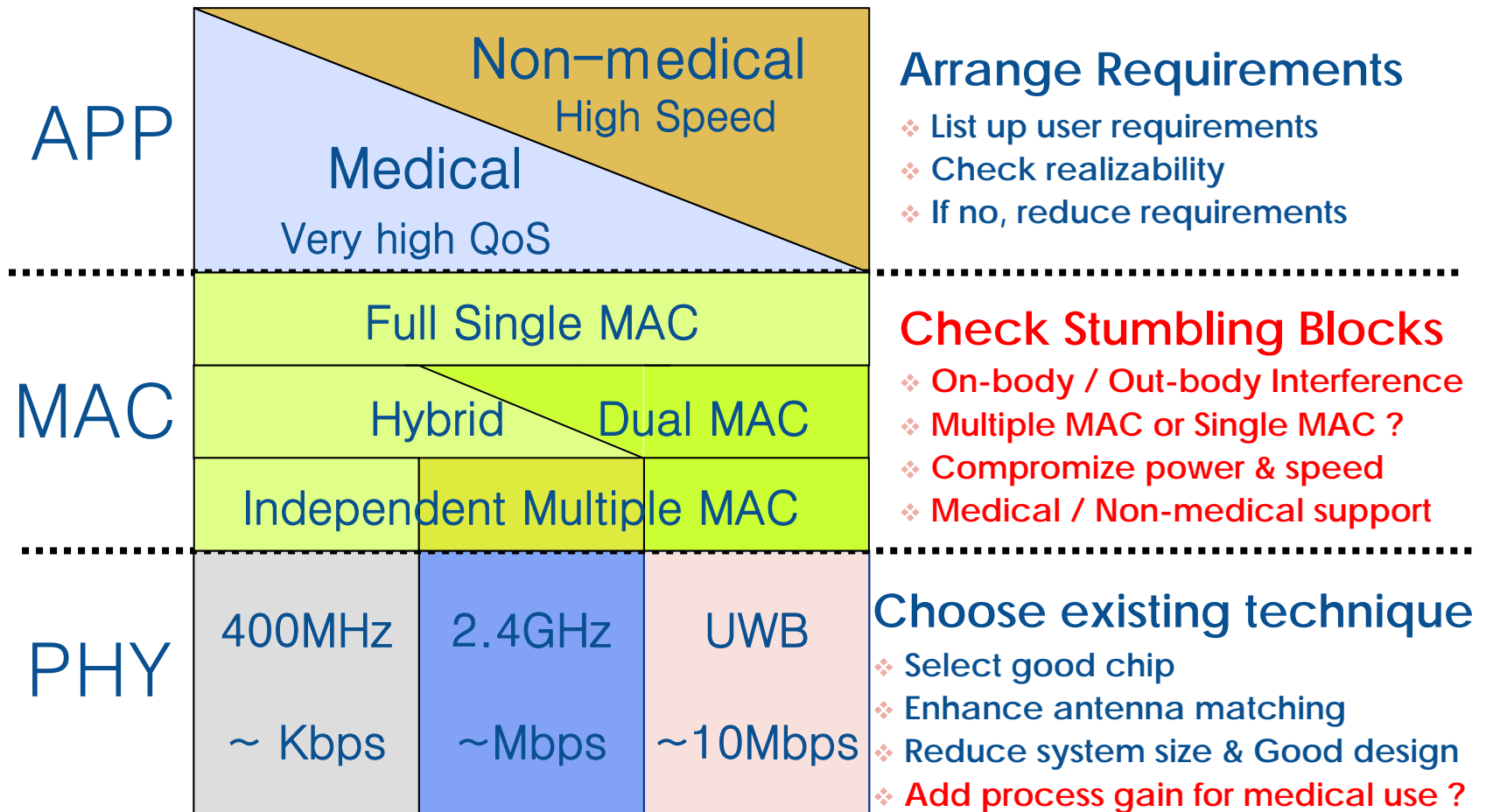


March 2008

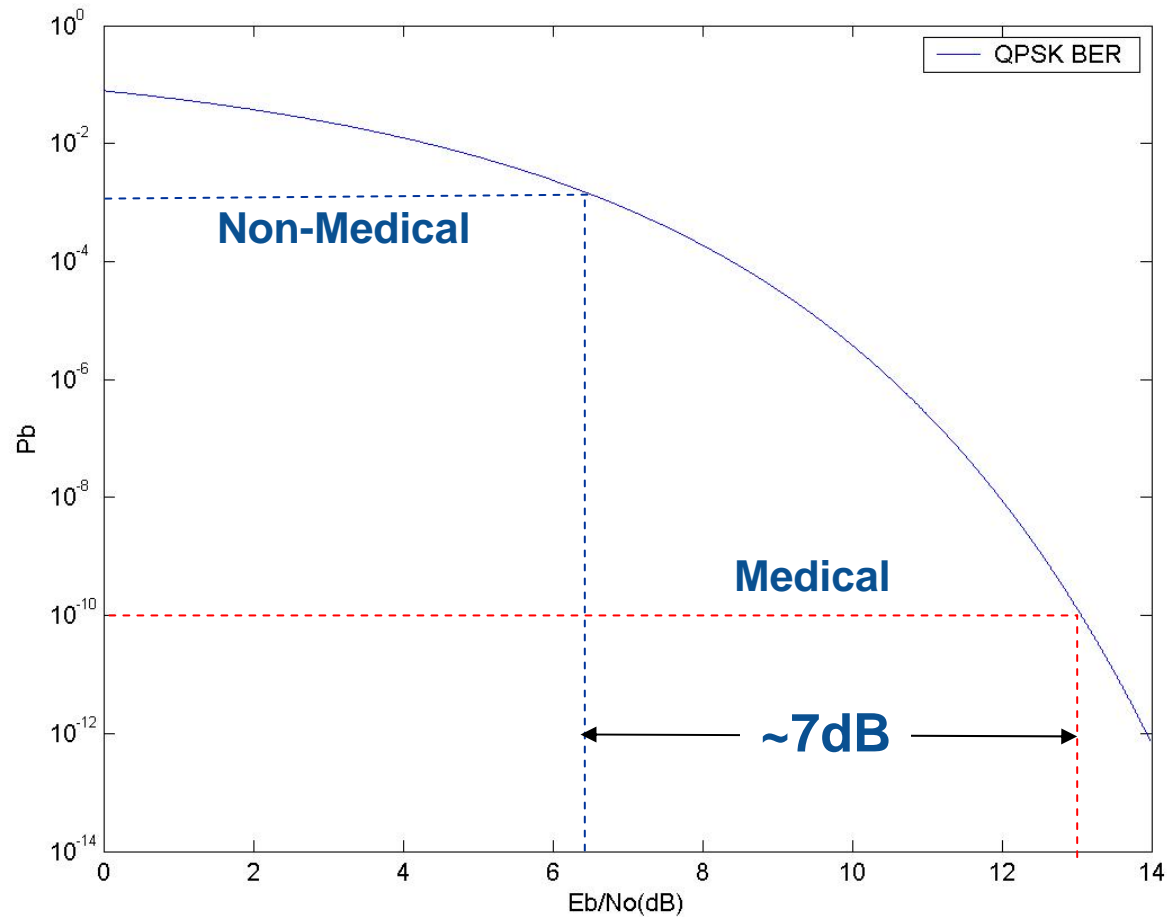
S. M. Ryu and T. H. Kim
CASUH

D. Y. Kim and C. S. Eun
Chungnam Univ.

Issues in WBAN Work Scope



Process Gain for Medical Use



Major Challenges of WBAN MAC (1)

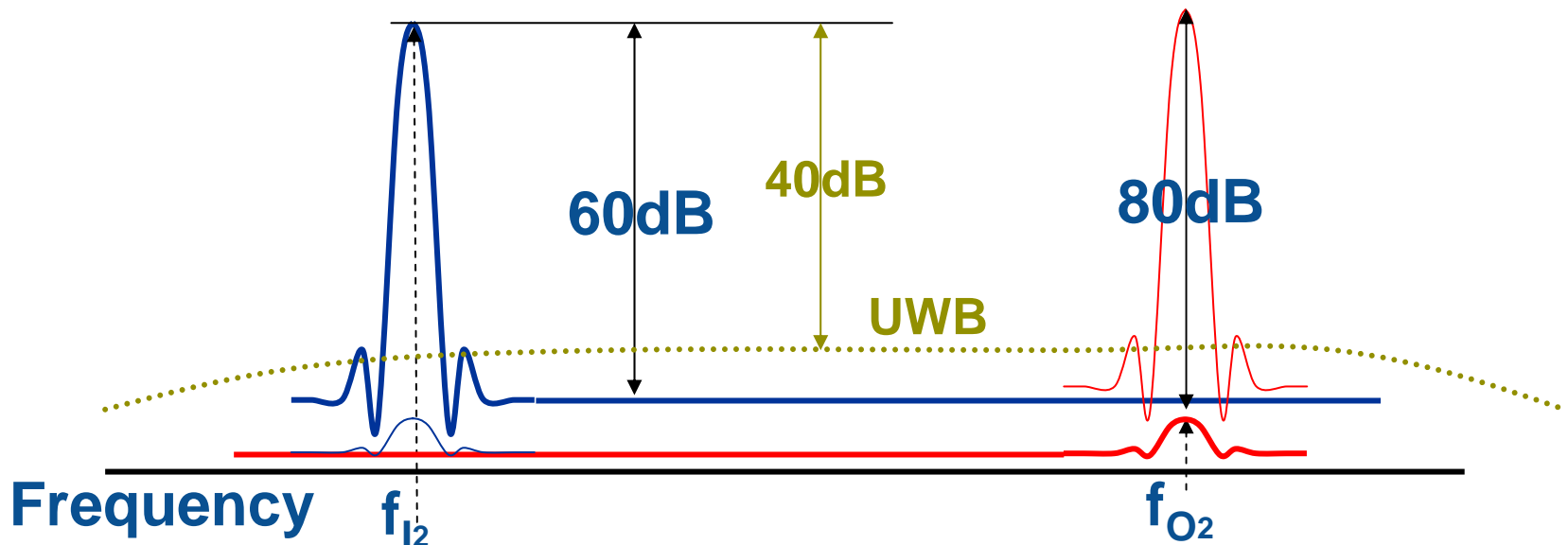
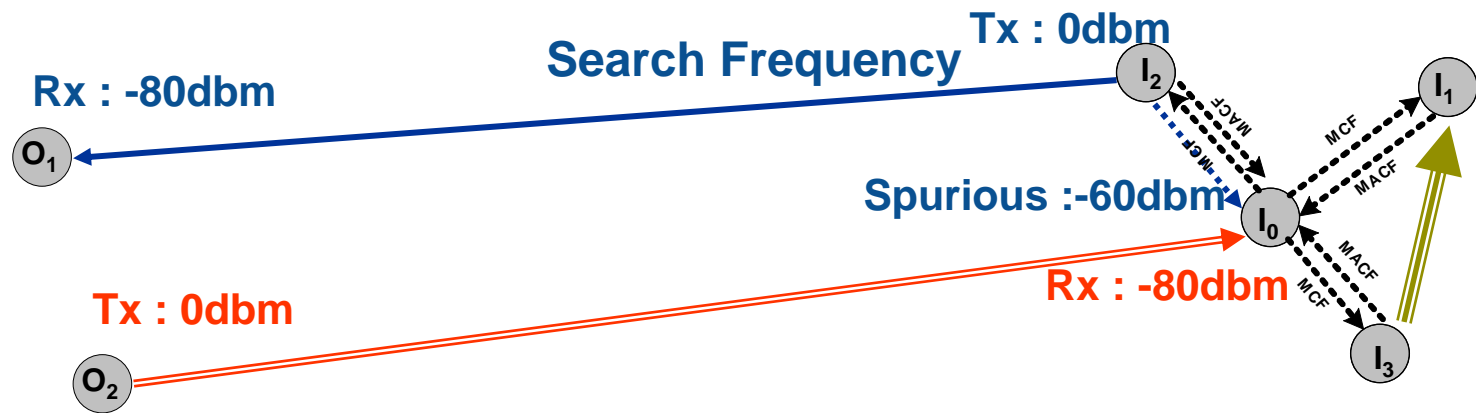
1. On(In)-body / Out-body Mutual Interference
 - ❖ On-body transmission fatally obstructs reception from out-body
 - ❖ Conventional techniques(CSMA, LBT) helpless
 - ❖ Any solution to overcome the On/Out problem?
2. Multiple PHY & Single MAC
 - ❖ Inevitable to use multiple PHYs, yet a single MAC is desired.
 - ❖ Any solution to support multiple speeds with a single MAC?

Major Challenges of WBAN MAC (2)

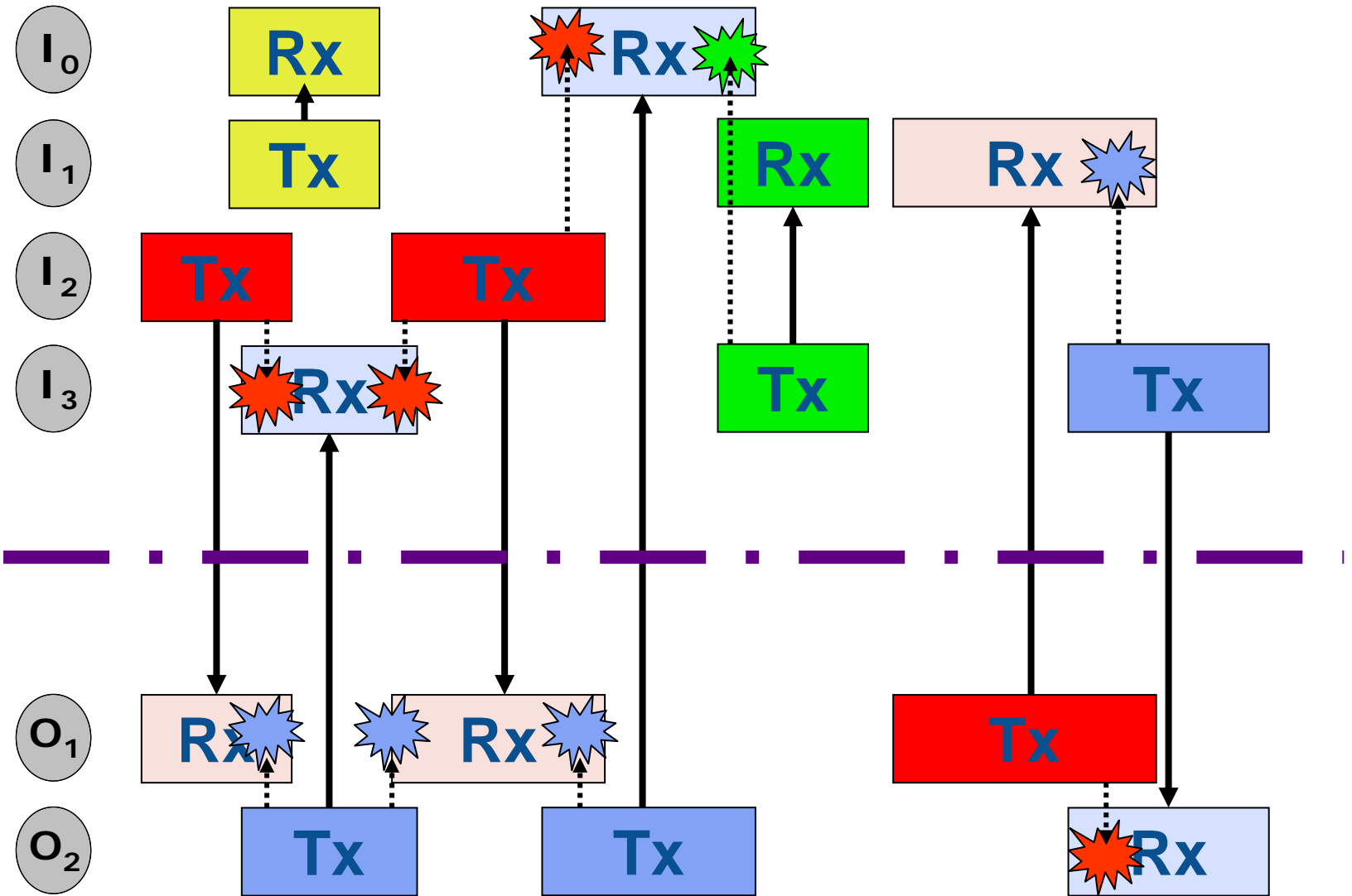
3. Power Consumption vs Speed & Duty Cycle
 - ❖ Higher Speed needs Higher power consumption
 - ❖ What will be the speed limit to compromise power consumption ?

4. Medical / Non-Medical Dual support
 - ❖ Medical : Low speed (~Kbps) ;
 - high QoS (BER < 10^{-10})
 - ❖ Non Medical : Higher Speed is Better ;
 - Reasonable QoS (BER < 10^{-3})
 - ❖ Any solution to support dual purpose ?

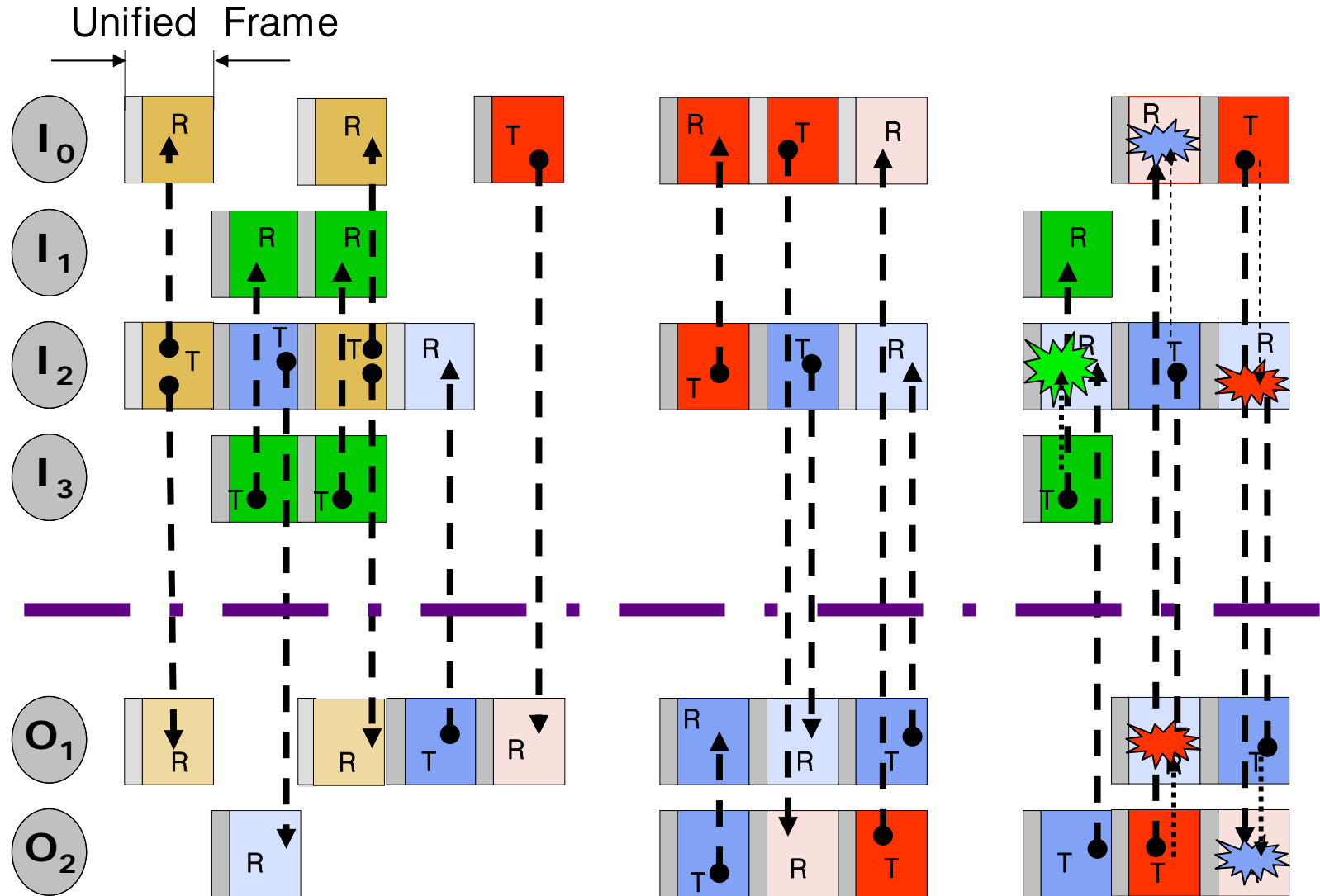
On(In)-body / Out-body Interference



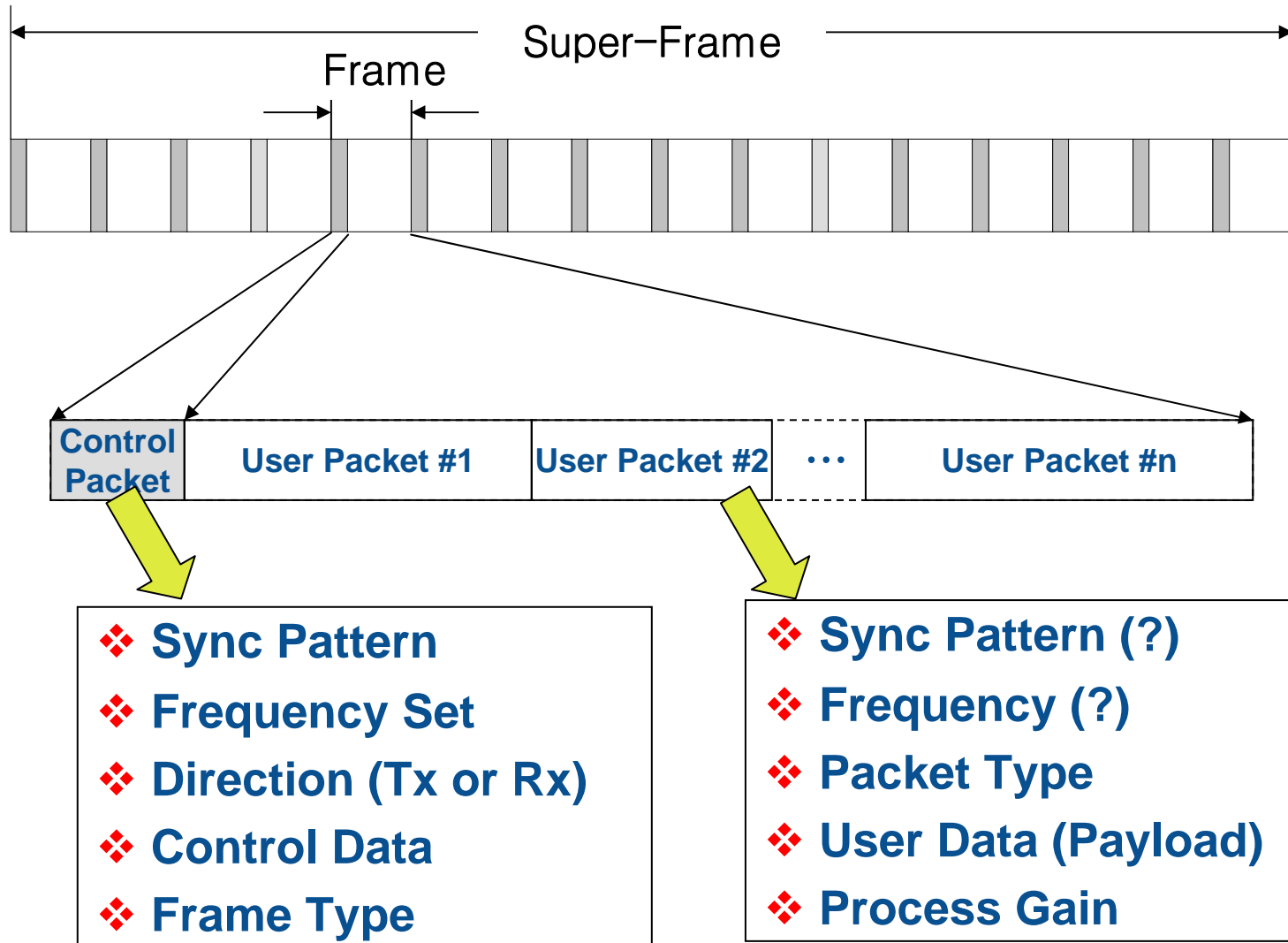
On(In) / Out Interference



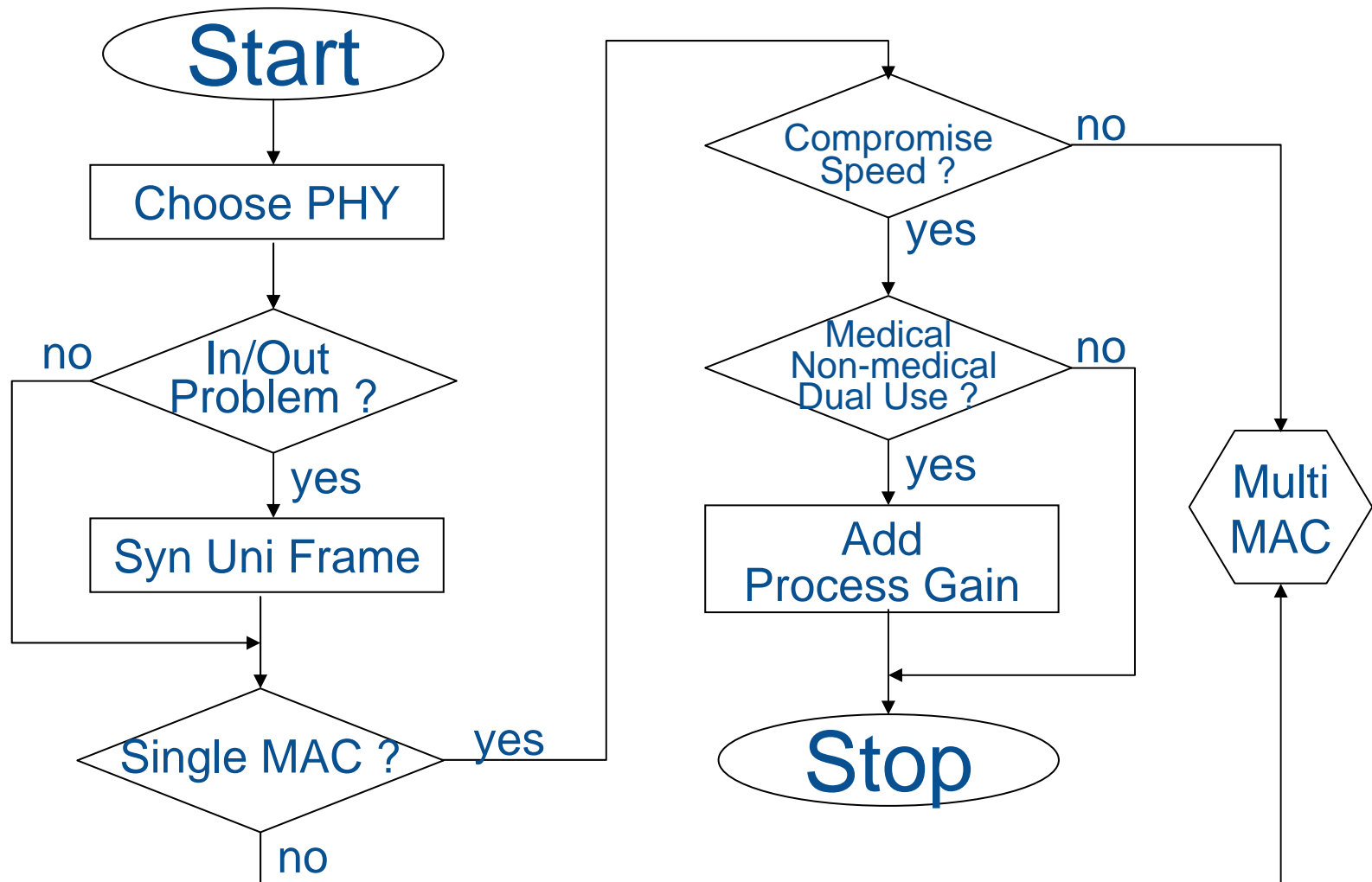
Synchronized Frames



Synchronized (Super-)Frame



WBAN Selection Process



Conclusion

- ❖ On(In)-body / Out-body Interference is fatal in WBAN.
- ❖ MAC with Synchronized Frames can solve the In/Out Problem.
 - ◆ not Rx during adjacent Tx, there is no interference
- ❖ Synchronized frames may also facilitate multiple payload speeds with a novel control packet design
 - ◆ Thus realizing a single MAC with multiple PHY
- ❖ **Synchronized frames for both On(In)/Out Interference Avoidance and Multiple Speeds**