

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

Submission Title: [Response to Call for Preliminary Proposal in IEEE802.15.4d Task Group]

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Re: [15-07-0860-02-004d-call-proposals.doc]

Abstract: [Response to Call for Preliminary proposal in IEEE802.15.4d Task Group. Our proposal focuses on low cost and low power consumption.]

Purpose: [To show our preliminary proposal and discuss in IEEE802.15.4d Task Group.]

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Agenda

- Japanese Consultation of 950MHz
- Our approach to IEEE802.15.4d Task Group
- Preliminary proposal for IEEE802.15.4d Task Group

Japanese consultation overview (1/3)

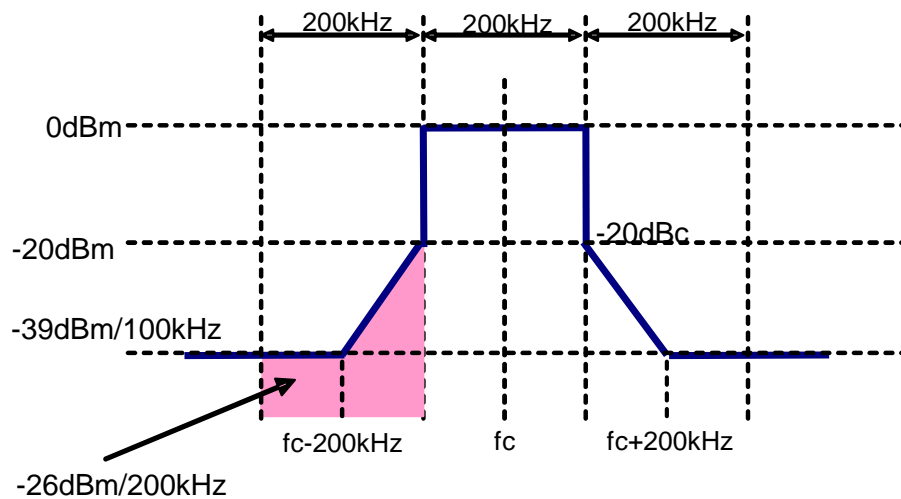
- Frequency band
 - 950.8MHz-955.8MHz (5.0MHz)
- Channel bandwidth
 - $(200 \times n)$ kHz (n is integer from 1 to 3)
- Antenna power
 - 1mW or less for all of unit radio channel
 - 10mW or less for unit radio channels from 954MHz to 955MHz

Japanese consultation overview (2/3)

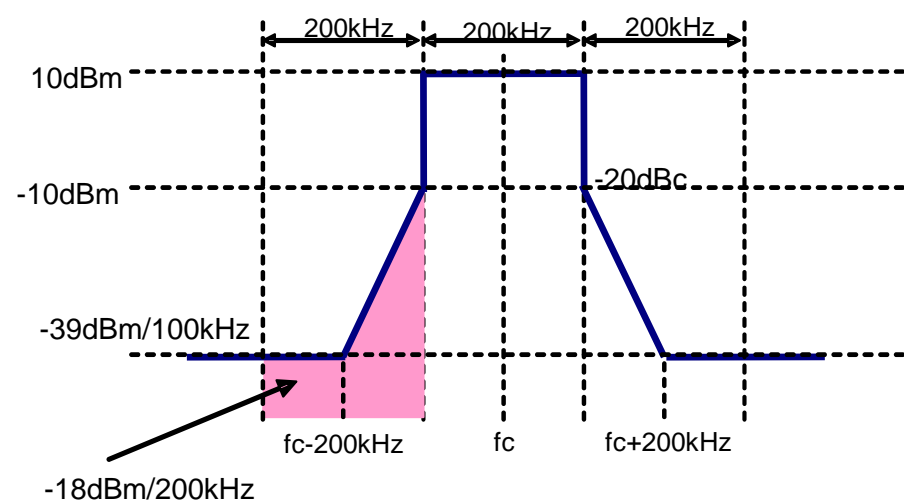
PSD mask

- Level of channel edge: 20dBc
- Power of adjacent channel: less than -18dBm (10mW)
less than -26dBm (1mW)

1mW



10mW

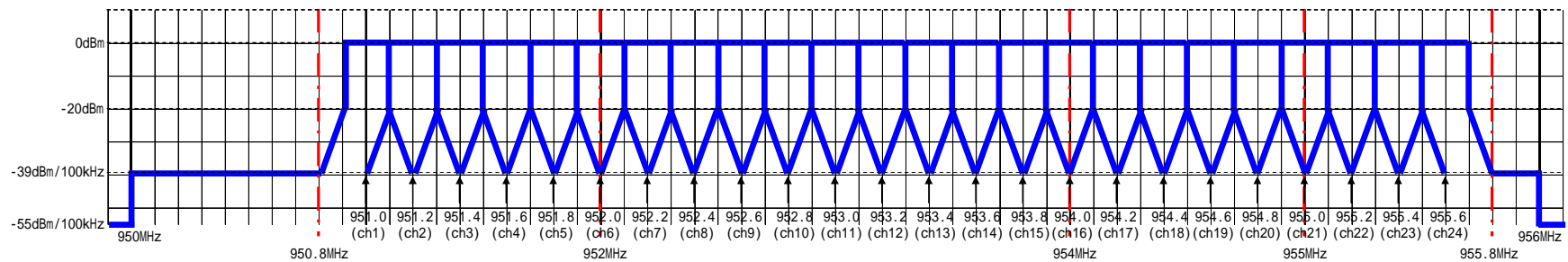


Japanese consultation overview (3/3)

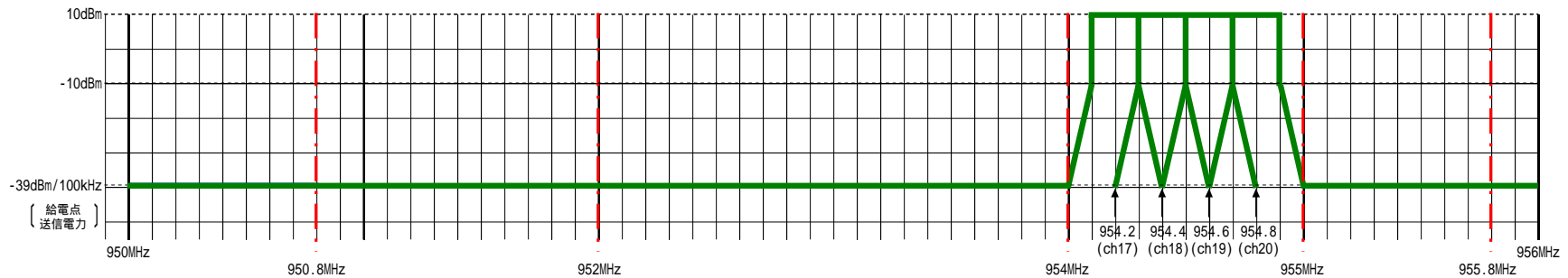
Channel allocation

(200kHz channel allocation)

Antenna power = 1mW



Antenna power = 10mW



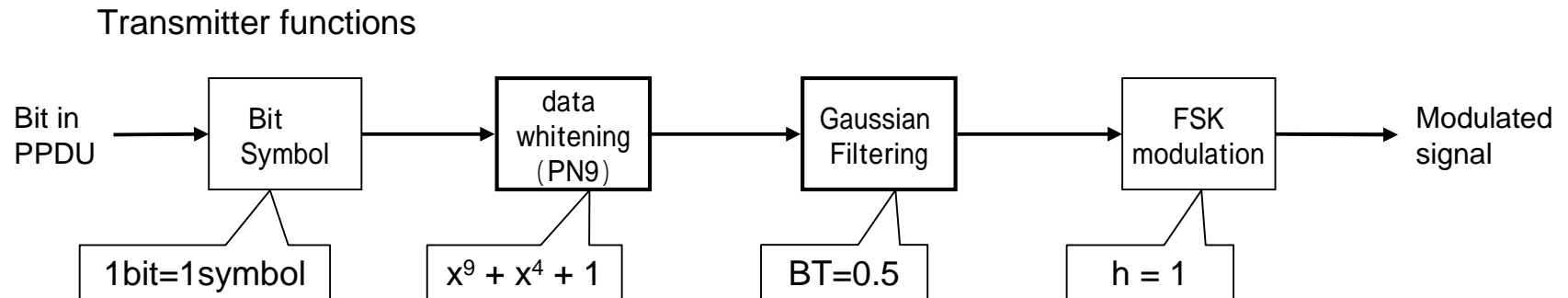
Our approach to 802.15.4d

- 802.15.4d is a new PHY for Japanese WPAN that is used by low cost and low power sensor network.
- Low cost and low power consumption have the highest priority.
- Requirement
 - Low cost & Low power consumption
 - Low cost and low power consumption are more important than high data rate
 - Appropriate number of available channels
 - For sensor network applications.
 - Not only 1mW channels but also 10mW channels
 - Requirement of some applications

Preliminary Proposal for TG4d (1/2) PHY

| Modulation parameters | | | | | |
|-----------------------|-------------------|-----------------------|------------------|-----|----------------------|
| Channel Bandwidth | Bit Rate (kbit/s) | Symbol Rate (k sym/s) | Modulation type* | BT | Modulation Index (h) |
| 400kHz | 100 | 100 | GFSK | 0.5 | 1 |

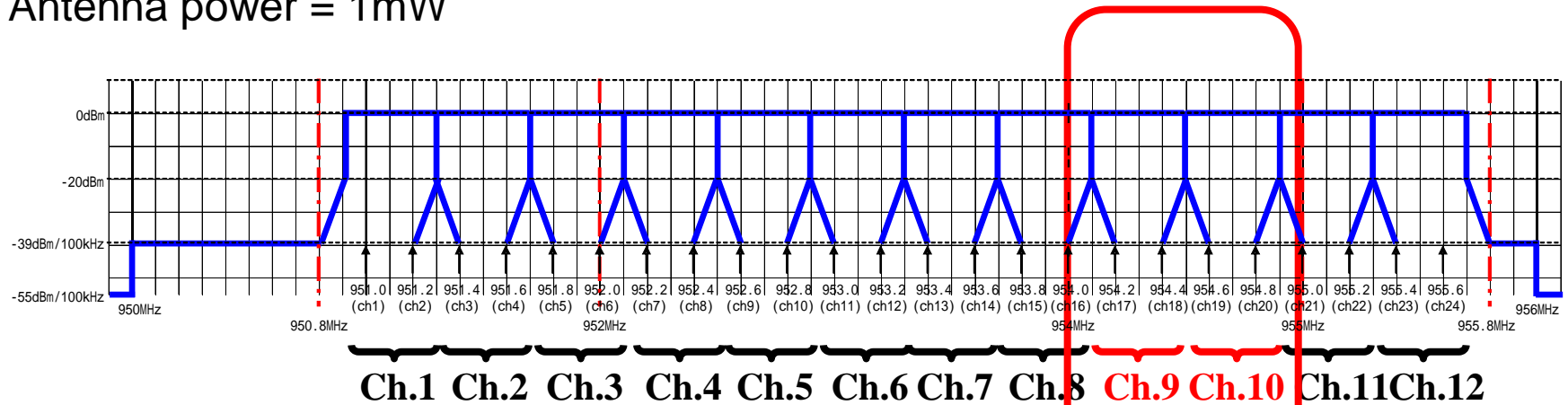
(*Our proposal does not use spread spectrum technology)



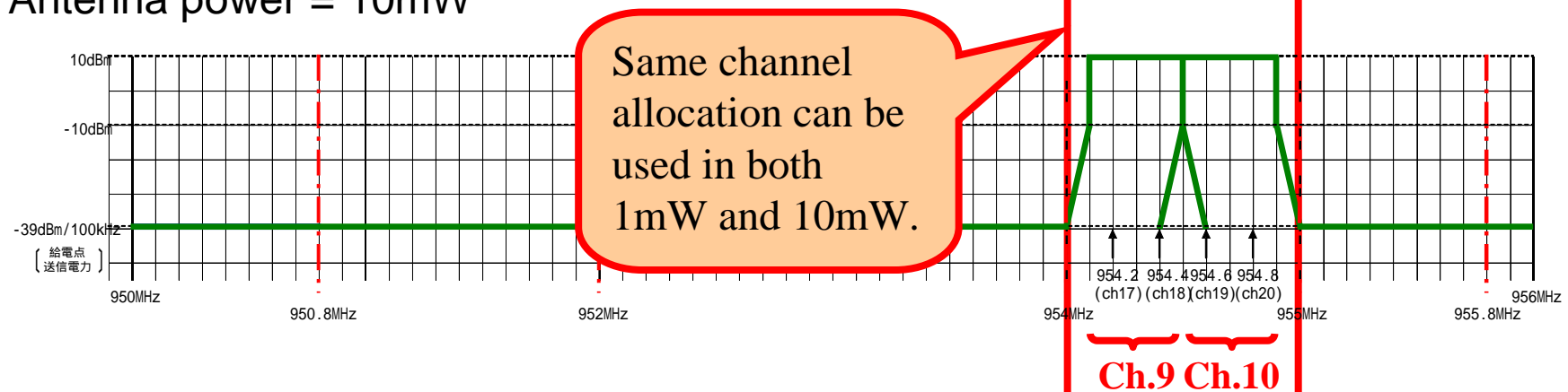
Preliminary Proposal for TG4d (2/2)

Channel plan

Antenna power = 1mW



Antenna power = 10mW



Same channel allocation can be used in both 1mW and 10mW.

Advantages of proposed GFSK PHY?

- Low power consumption
 - A high efficiency non-linear amplifier can be used
 - Low complexity modem
- Low cost LSI
 - Low complexity modem
 - Small area of LSI
- High receiver sensitivity
 - Achievable at low cost and low power consumption
- Low emission outside the 400kHz channel
 - Meets Japanese Regulations at both 10 and 0dBm output power

Why 400kHz bandwidth?

- Single bandwidth solves compatibility issues
- Max data rate in 200kHz is too low
- Two 10mW channels available
 - Only one single channel available when 600kHz bandwidth is used

Summary

- Our proposal is a new PHY for the Japanese WPAN that is suitable for low cost and low power consumption sensor networks.
- Low cost and low power consumption have the highest priority.
- Our proposal to the 802.15.4d
 - Modulation = GFSK (BT=0.5), modulation index = 1
 - Low cost and low power consumption can be achieved.
 - Bandwidth = 400kHz
 - Data rate = 100Kbps
 - Appropriate number of channels are available.
 - Not only 1mW channels but also 10mW channels can be used.
 - 10mW node and 1mW node can be communicate directly.