

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

Submission Title: [ETRI MAC Proposal on Color Packet]

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Re: [Response to call for proposals]

Abstract: [This document describes ETRI MAC proposal on VLC color packet]

Purpose: [Proposal to IEEE 802.15.7 VLC TG]

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ETRI MAC Proposal on Color Packet

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What is Color Packet?

- Color Packet is a packet to provide information such as device status and channel quality to the user intuitively.

Application Scope of Color Packet

- We can use Color Packet in VLC applications with various colors.
- Examples of VLC applications with Color Packet
 - Mobile to mobile VLC
 - VLC between Toys
 - Remote Controller
 - Application with asymmetric data transfer

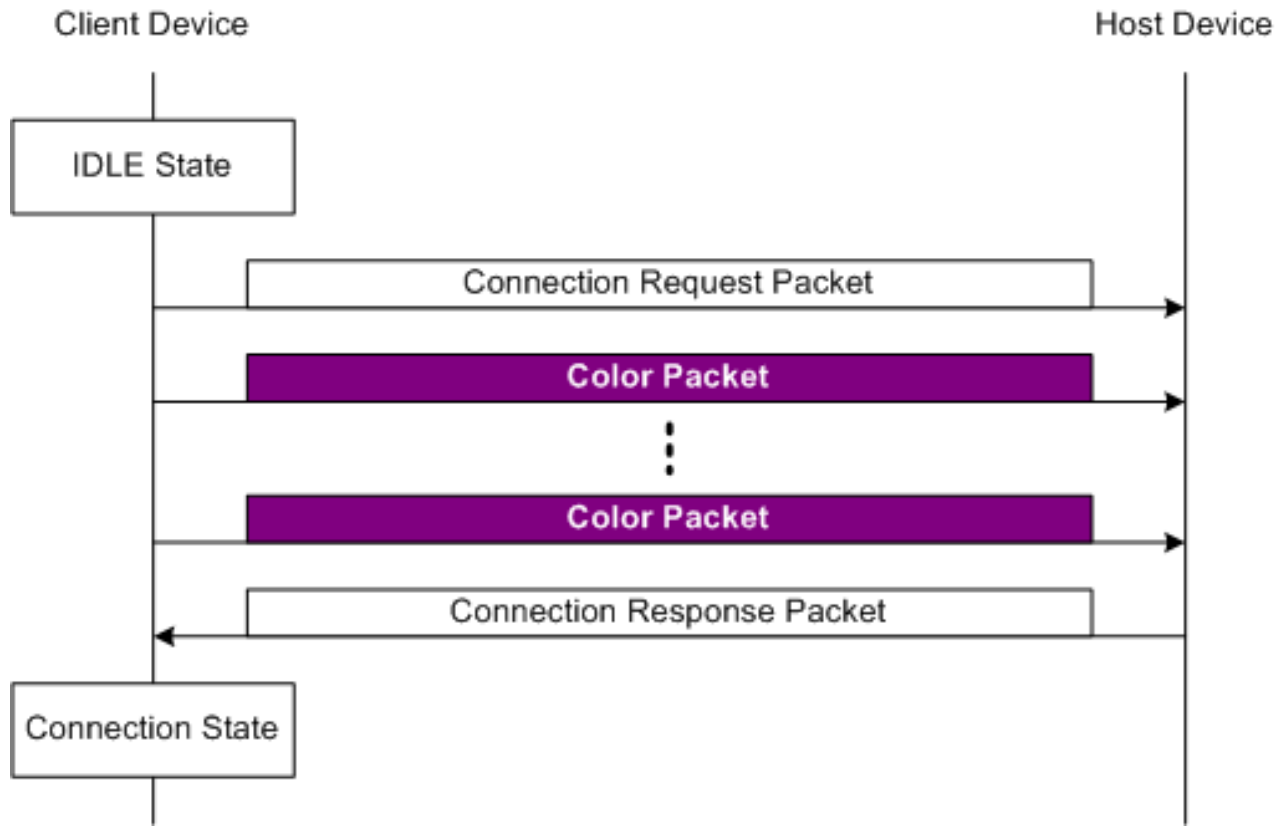
Color Packet Usage

- By using Color Packet, we can supply information to user intuitively or transfer messages to peer device.
 - For examples, in communication between application and user, we can directly see the status information such as current step of communication procedure, data transmission quality(PER, BER), transferred file size or remained file size with our eyes by using color packet.
 - For an example, in communication between device and device, device can transfer coarse link adaptation information to peer device by using color packet.

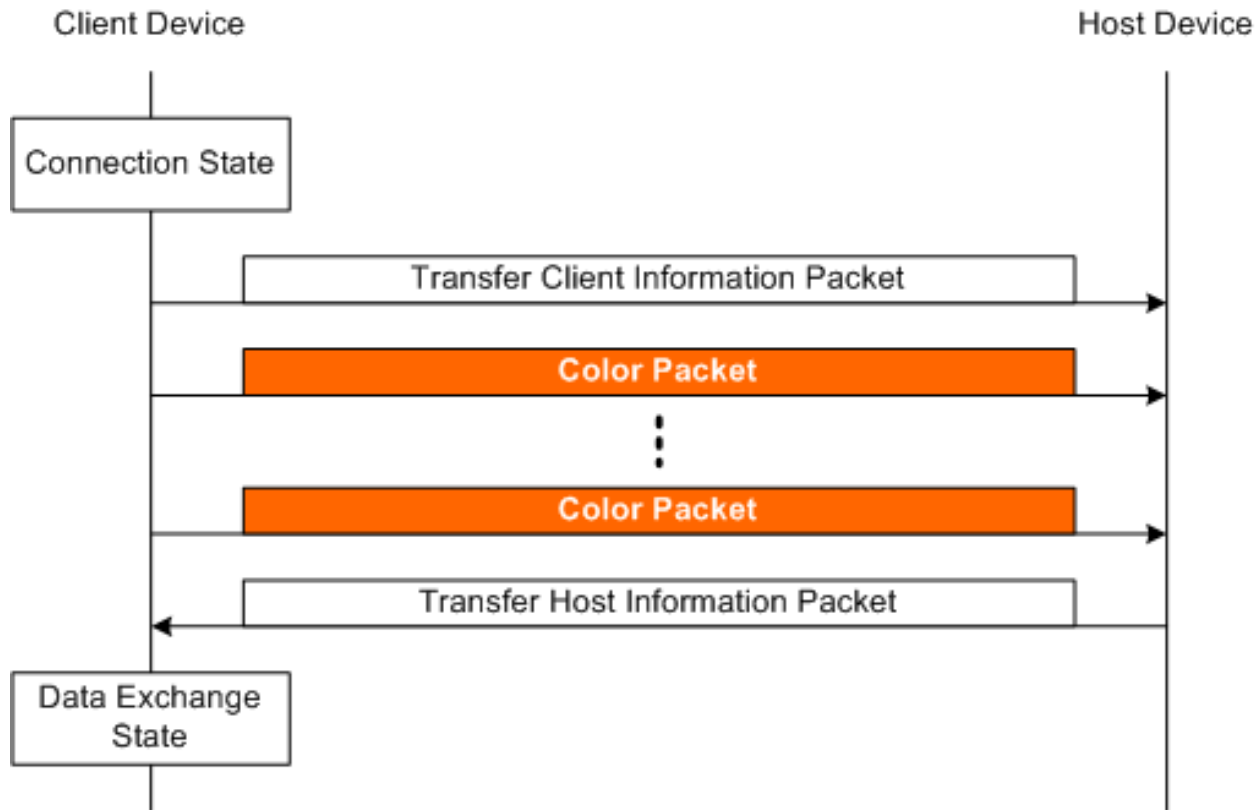
A Color Packet Usage for Basic Communication Procedures

- We define that MAC States consist of states following as:
 - IDLE State
 - Connection State
 - Data Exchange State

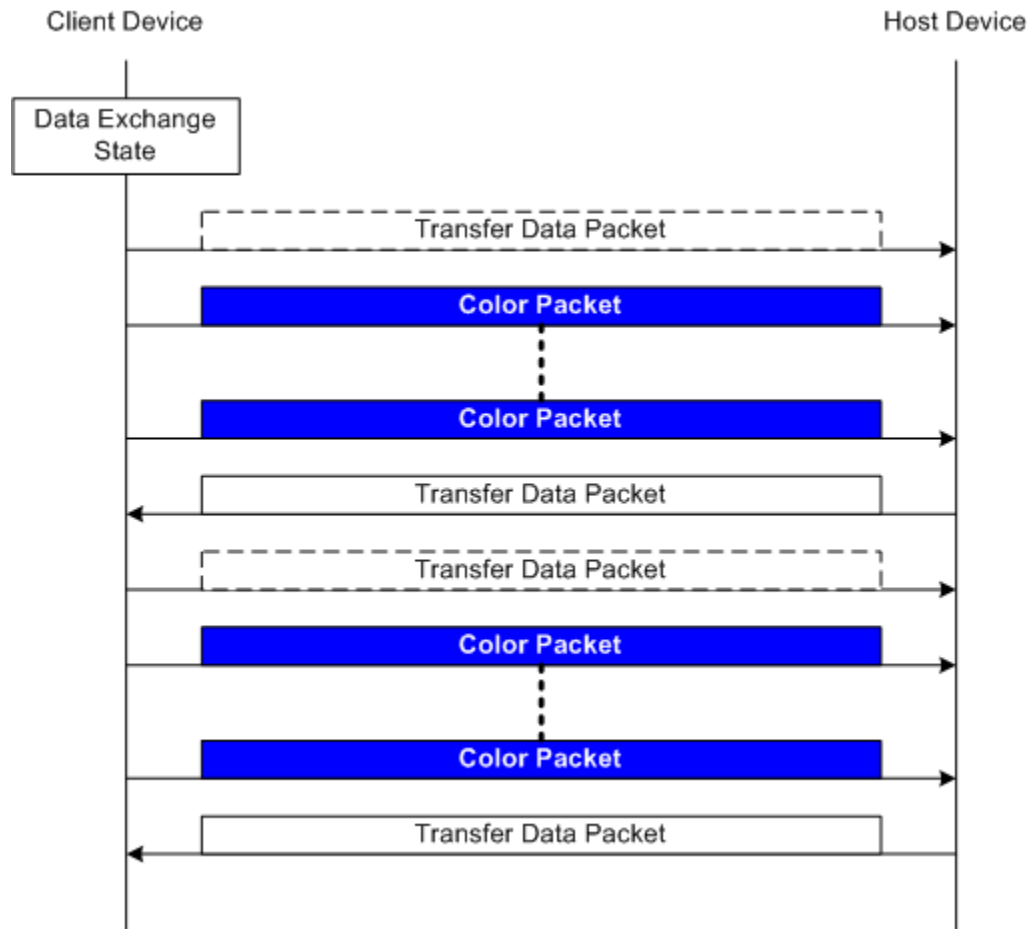
Step1 – A Color Packet Usage for Connection procedure



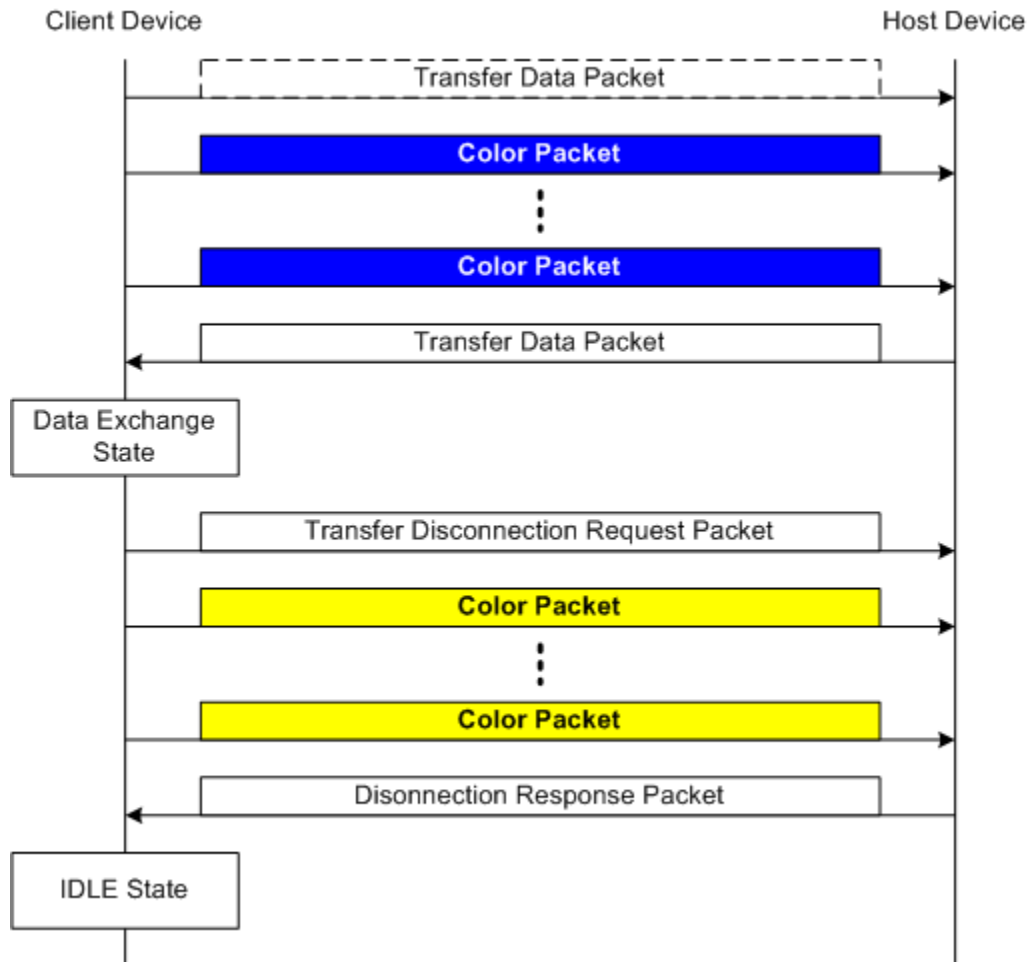
Step 2 – A Color Packet Usage for Exchange Information Procedure



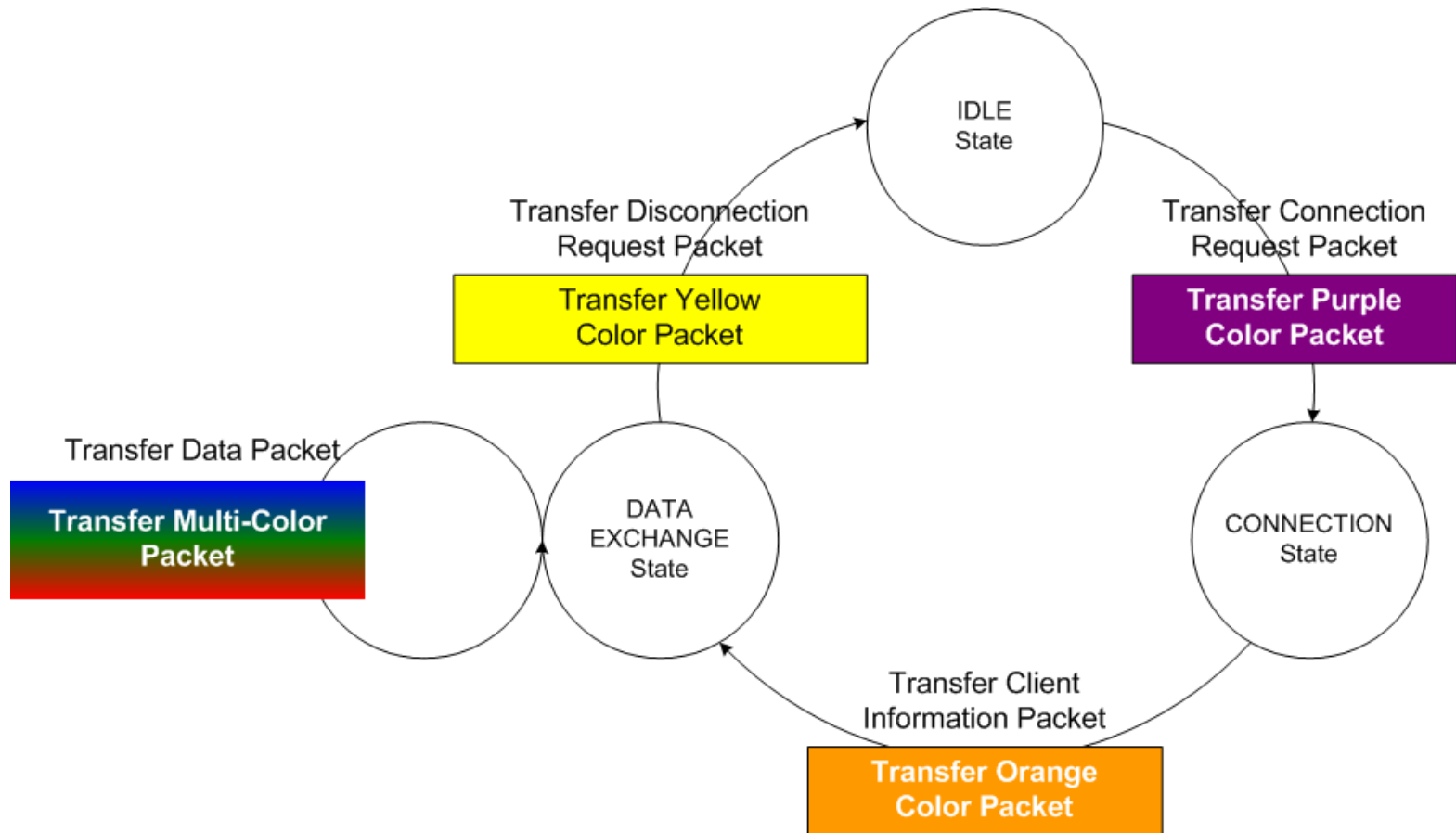
Step 3 – A Color Packet Usage for Transfer Data Procedure



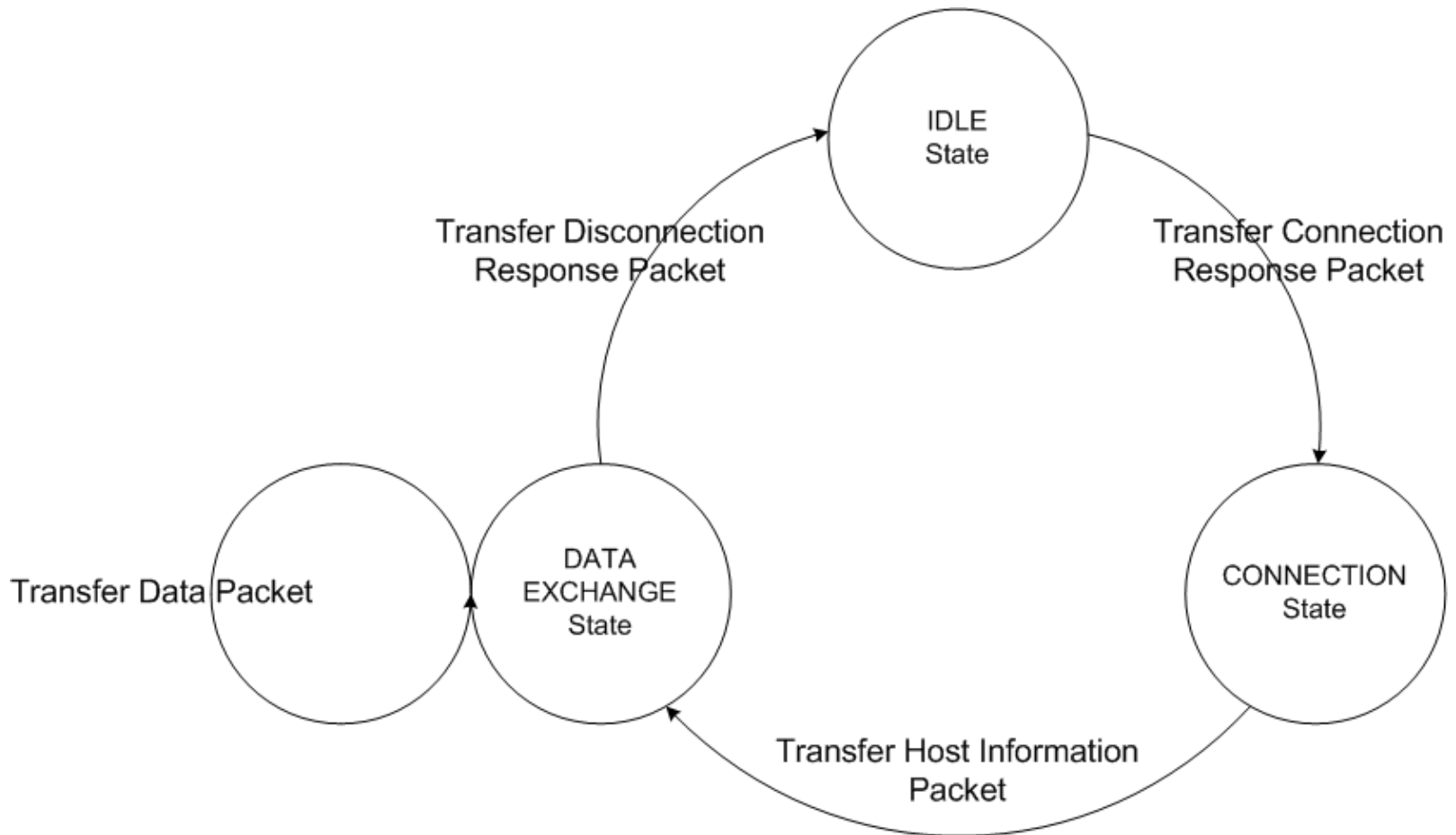
Step 4 – A Color Packet Usage for Transfer Disconnection Procedure



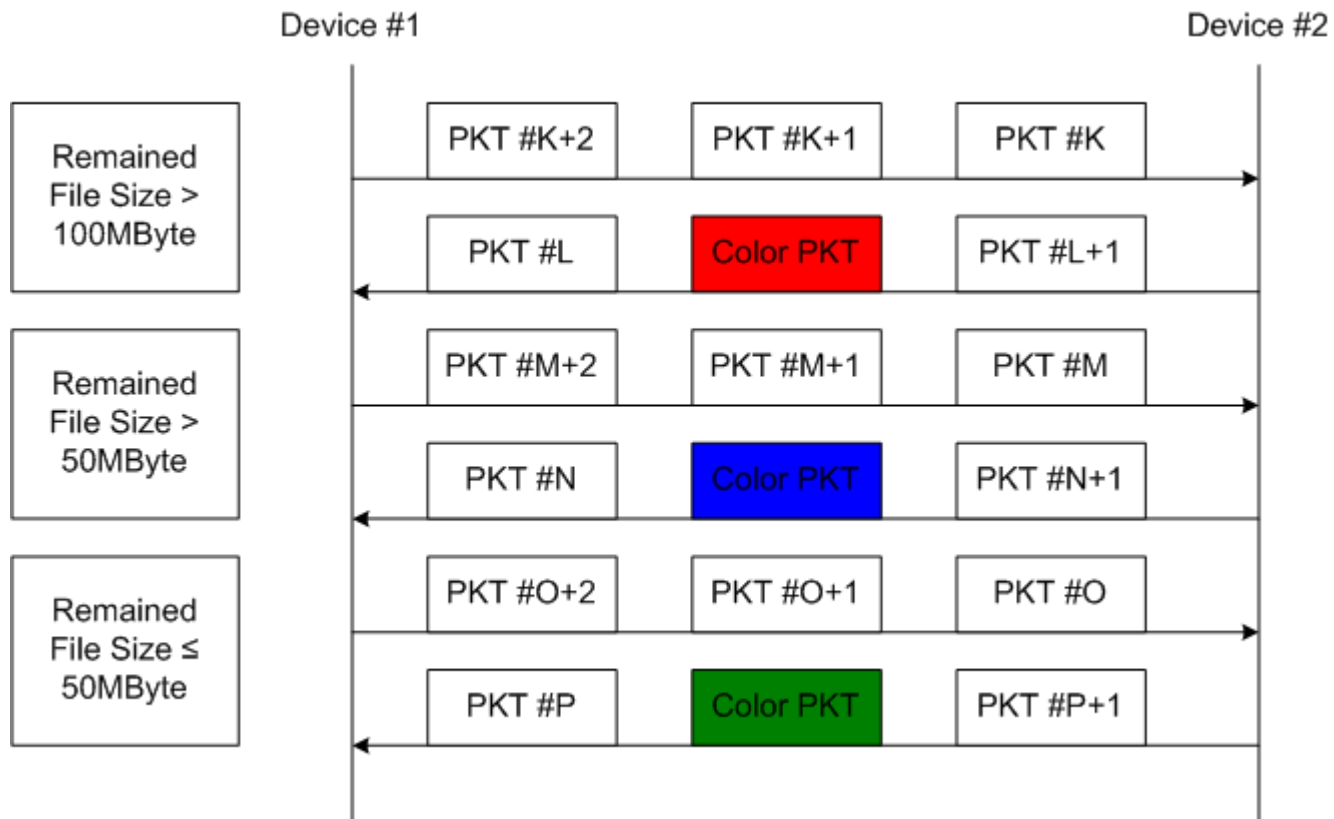
Client State Diagram



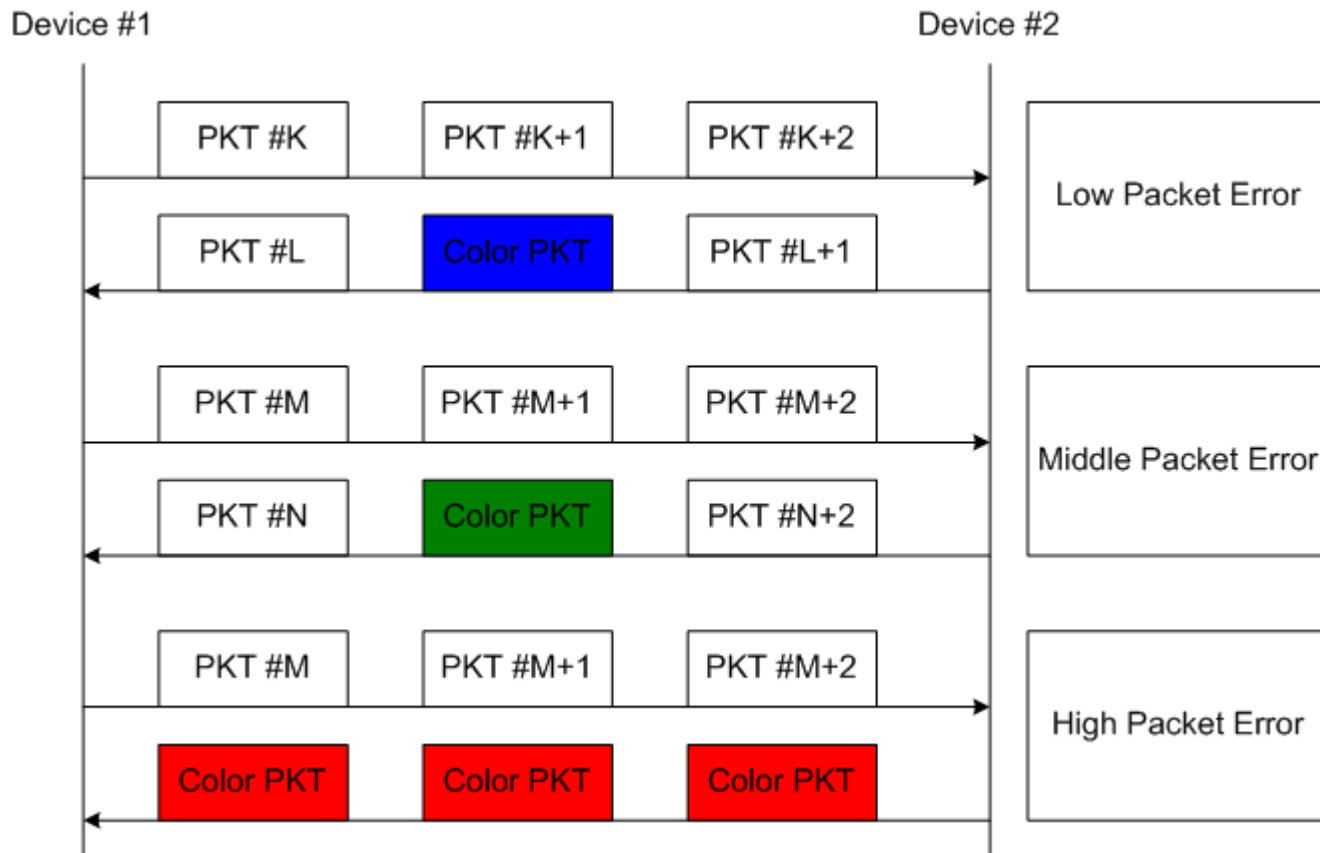
Host State Diagram



A Color Packet usage in File Transfer Application



A Color Packet usage for Informing Data Transmission Quality to User



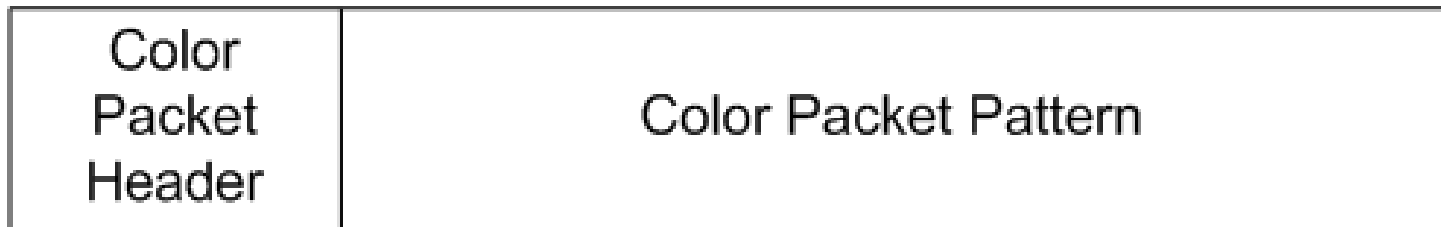
Color Status Table in Coarse Link Adaptation

Color of Color Packet	Data Transmission Quality	Action Item
BLUE	$PER < 1e^{-2} *$	Change higher modulation scheme
GREEN	$1e^{-2} * \leq PER < 1e^{-1} *$	Hold current modulation scheme
RED	$PER \geq 1e^{-1} *$	Change lower modulation scheme

* Different values according to application

Color Packet Structure

- Color Packet Header
 - Color Packet Indicator(CPI)
 - Peer Device Information Indicator(PDII)
- Color Packet Pattern



Summary on Proposal

- We maximize the visibility which is one of VLC's advantages by using Color Packet.
- Color packet has the effects that informs intuitively to user without additional indicator.
- Device can use Color Packet to transfer the information messages to peer device.
- We need an interface between Upper layer and MAC layer to support Color Packet Configuration.
- We need a MAC Scheduling for Color Packet Supporting.