CAPWAP related

draft-shao-opsawg-capwap-hybridmac-00
draft-chen-opsawg-capwap-extension-00
draft-zhang-opsawg-capwap-eap-00

Background

CAPWAP WG concluded at 2010 May,
Something has changed since that time,

- 802.11n not covered. Today product widely available
- More and more operators start to deploy large scale Wifi to offload Mobile Internet traffic.
- Standard protocol like IETF Capwap is needed other than MANY proprietary protocols

- Some small new extensions are needed

Background – cont.

Jointly presented in last IETF 85th OPSAWG, AD encouraged different draft for distinct problem. Either restarting capwap or adding it to the opsawg charter.

– 2 standard oriented drafts and 1 informational OPSAWG draft have been submitted

– More operators join, 4 operators now (China Telecom, AT&T, Softbank, China Mobile)

– More than 4 implementations and interoperation ongoing

Hybrid-MAC Model for CAPWAP

draft-shao-opsawg-capwap-hybridmac-00

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Functions in Local MAC and Split MAC

- As from RFC5416, local mac and split mac

Functions		Local MAC	Split MAC
Function	Distribution Service	AP/AC	AC
	Integration Service	AP	AC
	Beacon Generation	AP	AP
	Probe Response Generation	AP	AP
	Power Mgmt/Packet Buffering	AP	AP
	Fragmentation/Defragmentation	AP	AP/AC
	Assoc/Disassoc/Reassoc	AP/AC	AC
IEEE 802.11 QoS	Classifying	AP	AC
	Scheduling	AP	AP/AC
	Queuing	AP	AP
IEEE 802.11 RSN(WPA2)	IEEE 802.1X/EAP	AC	AC
	RSNA Key Management	AC	AC
	IEEE 802.11 Encryption/Decryption	AP	AP/AC

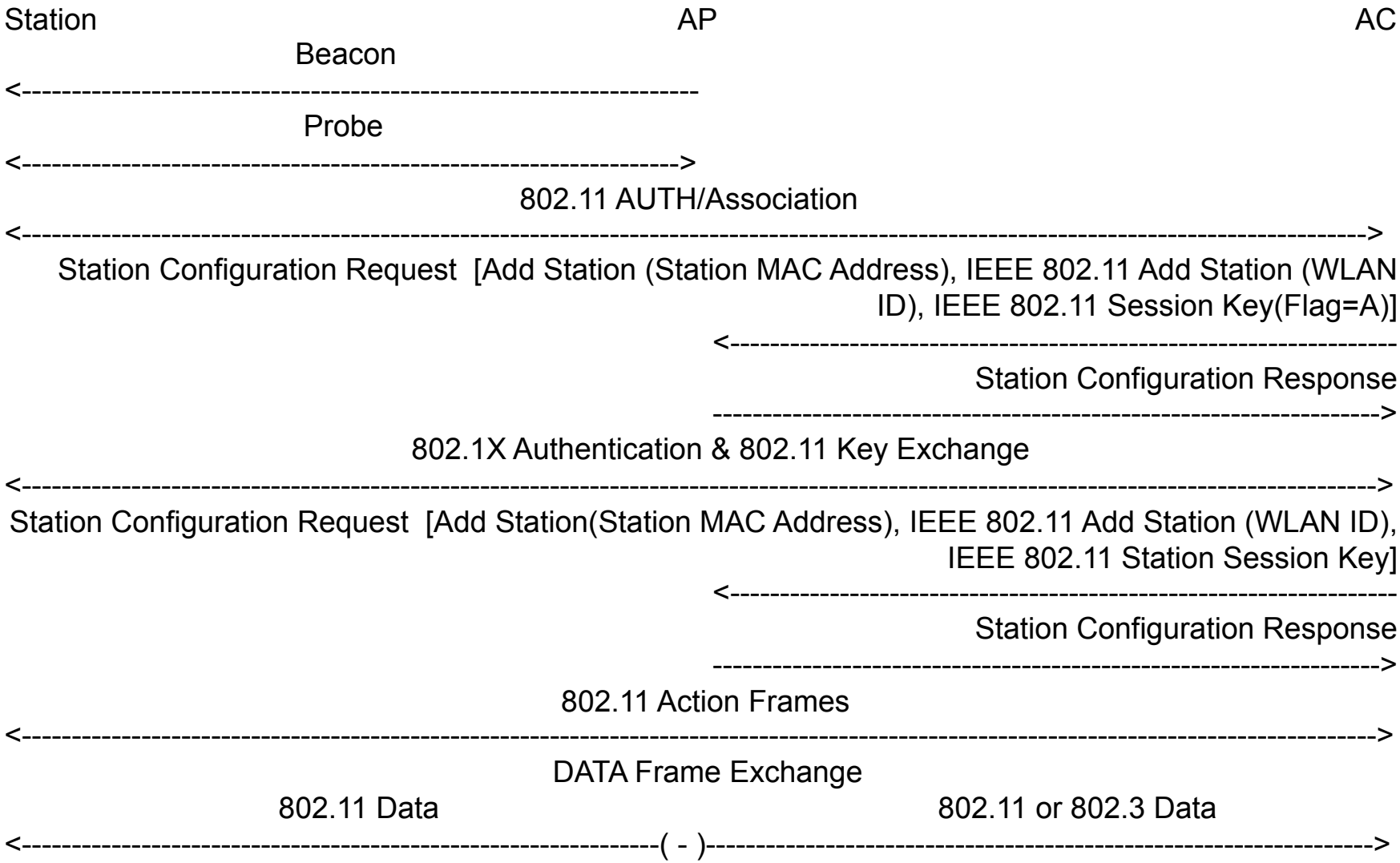
- Problem: It is difficult to inter-operate because these functions is not clearly defined about where to sit either AP or AC

Hybrid-MAC model recommendation

	Functions describe	Hybrid-MAC
Function	Distribution Service	AC
	Integration Service	AC
	Beacon Generation	AP
	Probe Response Generation	AP
	Power Mgmt /Packet Buffering	AP
	Fragmentation /Defragmentation	AC
	Assoc/Disassoc/Reassoc	AC
IEEE 802.11 QoS	Classifying	AC
	Scheduling	AP
	Queuing	AP
IEEE 802.11 RSN (WPA2)	IEEE 802.1X/EAP	AC
	RSNA Key Management	AC
	IEEE 802.11 Encryption/Decryption	AP

- If the functions have been clearly defined to be implemented in AP or AC, the interoperability will be much better between different vendors products.
- Targeting to IETF informational document

An example of frame exchange using the proposed Hybrid-MAC Model



CAPWAP Extension for 802.11n

draft-chen-opsawg-capwap-extension-00

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Hui Deng
Lei Zhu

Background

- In the last IETF meeting we presented draft-shao-capwap-plus-ps-01.
- Based on the comments received from AD and chairs we split draft-shao-capwap-plus-ps-01 in to separated drafts.
- Focus on the problem and proposals:
  - Why CAPWAP need to be extended?
  - What is the proposal?

Motivation: Features of 802.11n

- CAPWAP binding for 802.11 is based on IEEE 802.11-2007 standard.
- There were several amendments of 802.11 has been published later.
- IEEE 802.11n is one of those amendment and has been widely supported in current Wi-Fi production.
- IEEE 802.11n standard was published in 2009 and it is an amendment to the IEEE 802.11-2007 standard to improve network throughput.

Features of 802.11n (cont.)

- 802.11n supports three modes of channel usage: 20MHz mode, 40MHz mode and mixed mode.
- 802.11n has a new feature called channel binding. It can bind two adjacent 20MHz channel to one 40MHz channel to improve the throughput.

Features of 802.11n (cont.)

- In MAC layer, a new feature of 802.11n is Short Guard Interval(GI).
- 802.11a/g use 800ns guard interval between the adjacent information symbols.
- In 802.11n, the GI can be configured to 400ns under good wireless condition.

Features of 802.11n (cont.)

- Another feature in 802.11 MAC layer is Block ACK.
- 802.11n can use one ACK frame to acknowledge several MPDU receiving event.

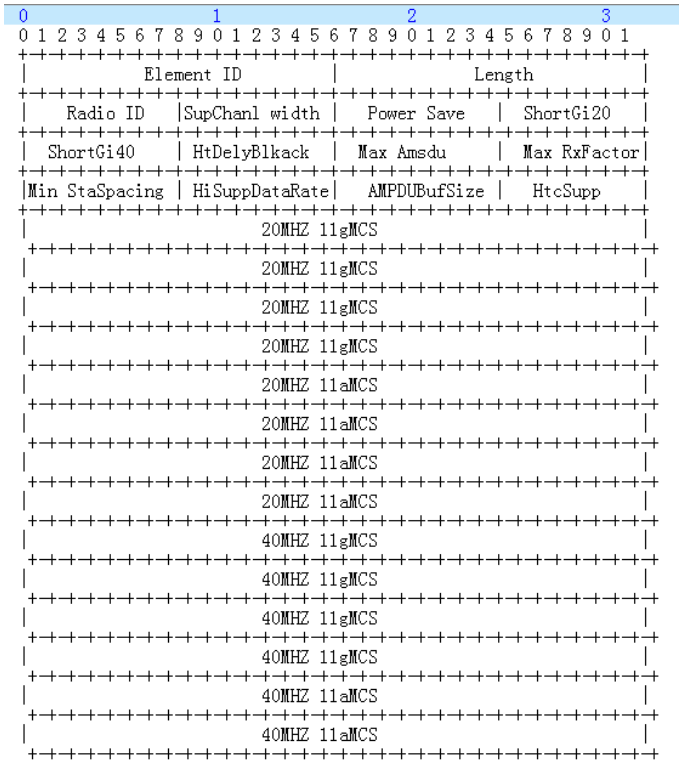
Proposal

- CAPWAP need to be extended to support the above 802.11n features.
- For example, CAPWAP should allow the access controller to know the supported 802.11n features and the access controller should be able to configure the different channel binding modes.
- One possible solution is to extend the CAPWAP information element for 802.11n.

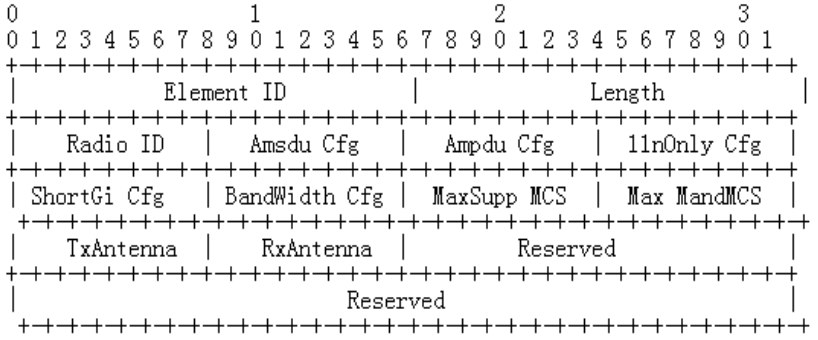
Extensions for CAPWAP

- There are couple of capabilities of 802.11n need to be supported by CAPWAP control message:
  - 802.11n Radio Capability Information Element.
  - 802.11n Radio Configuration TLV.
  - 802.11n Station Information.

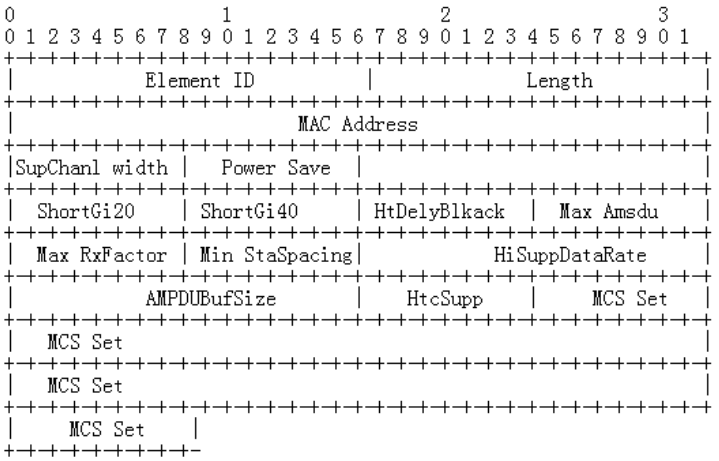
Summary of the Extension



(1) 802.11n Radio Capability Information



(2) 802.11n Radio Configuration TLV



(3) 802.11n Station Information

Encapsulation of EAP Messages in CAPWAP Control Plane

draft-zhang-opsawg-capwap-eap-00

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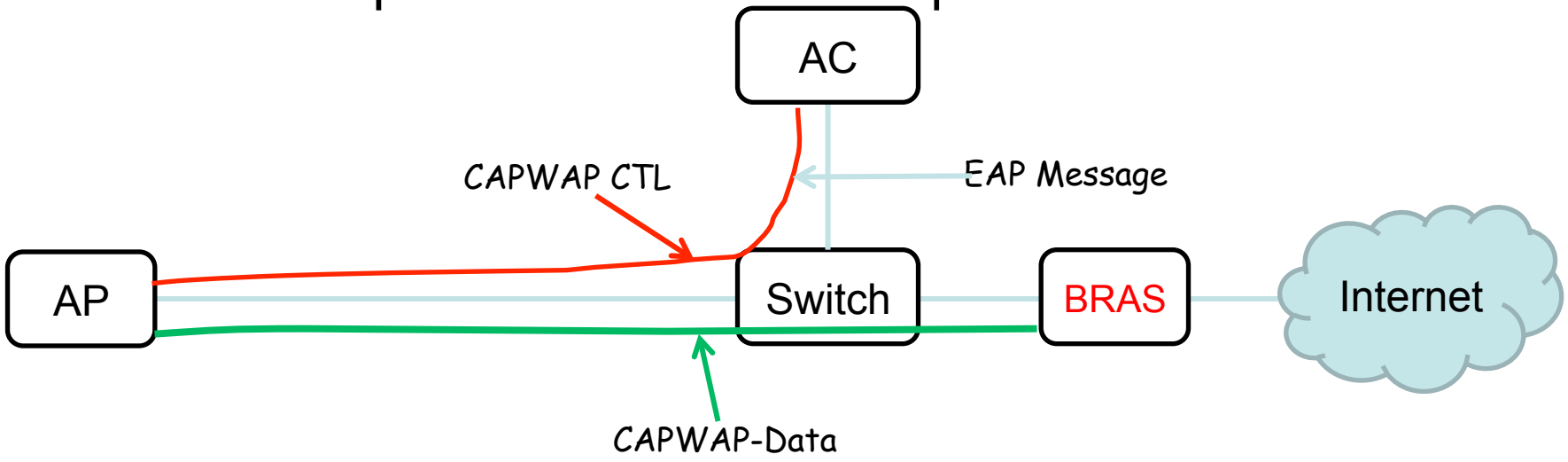
China Telecom
Zhen Cao, Hui Deng
China Mobile
S. Gundavelli
Cisco

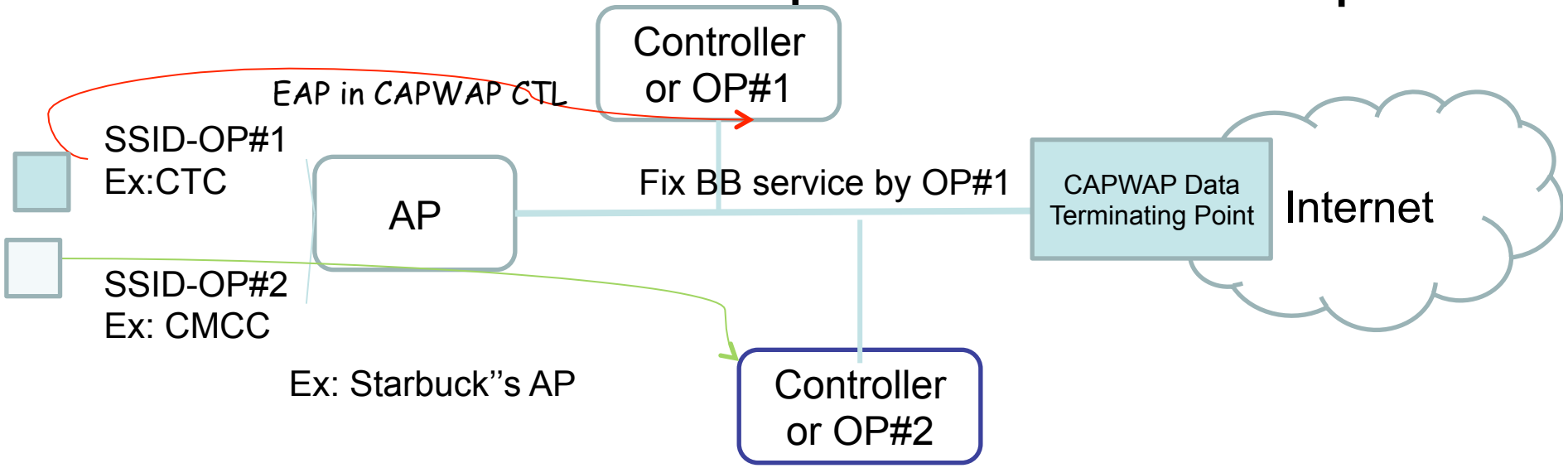
Scenario 1: Performance stress requires Data & CTL separation on AC

Problem: For AC+AP deployment trend, data flow goes through AC ->**AC** **performance stress**
Solution: **separating data &control flows on AC**
But: EAP is by default encapsulated into the CAPWAP-Data Plane; other than control plane

Engineering Problem: a scenario of data and control separation, the EAP message should be encapsulated in CAPWAP-CTL plane in stead of data plane.



Scenario 2: Application of Different WiFi operators and Fix Broadband operators in a hotspot



- Operator #1 is running the WiFi network in a venue e.g., hotels, Starbucks ;Operator #2 configures the AP with a new SSID and provides service for its own customers;WLAN Data flow & Control flow go to different operator's infrastructure,
- Authentication using different SSID should be forwarded to different AC controller .

Solution, straight forward though?

Extending CAPWAP Message Types to ENCAPSULATE EAP Messages

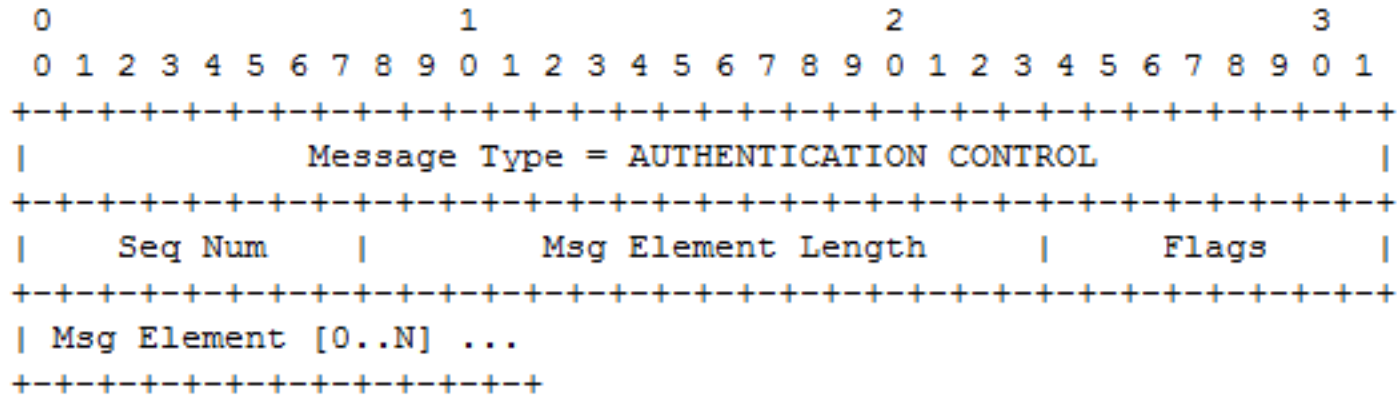
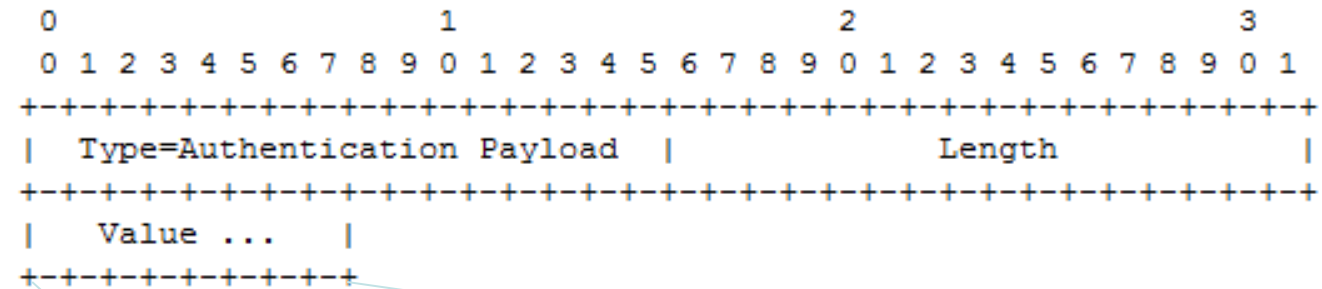


Figure 3: The CAPWAP-EAP Control Message Header



Message Element for EAP

EAP Packet → | code | identifier | length | data |

Next Step in IETF

- Adopt 3 drafts as a working group draft ?
  1) How many people read these 3 drafts?
  2) How many people support to accept?
  3) How many people disagree?

Thank you !

Alternative 2

- Adopt two drafts (except EAP draft) as a working group draft ?
  1) How many people read 2 drafts?
  2) How many people support to accept 2?
  3) How many people disagree on this?

Alternative 3

- Adopt two drafts (except EAP draft) as a working group draft ?
  1) How many people read 2 drafts?
  2) How many people support to accept 2?
  3) How many people disagree on this?

Problems of non-standard AP-AC

- In the scenario of multi-vendors AP/AC deployment, the standard interface between AP and AC is needed for large scale carrier grade Wi-Fi.
  - **Incremental deployment:** deployment flexibility is an important influence factor for operators.
  - **Network maintenance issues:** network administration team are difficulty to be aware of multiple protocols. It's not easy for the operators to maintain their network, the network management system must support different vendors' products, which will increase the maintenance cost.
  - **Unify testing tools:** Due to private interface, it's difficult to develop a unified platform to test the performance of AP & AC .