

2014 ALERT2 Workshop AUG Conference

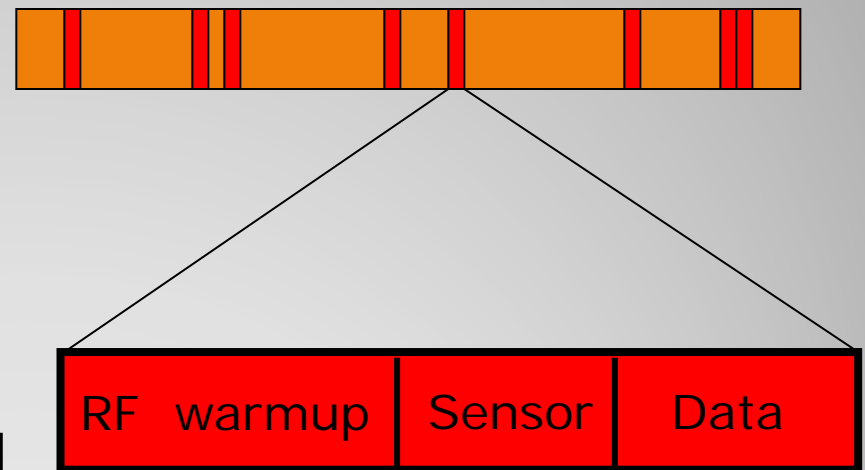
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- Today's Agenda:

- We will take a brief look at legacy ALERT protocol
- We'll discuss the mechanics of assigning time slots to ALERT2™ devices
- We will be looking at system design with the possibility of multiple repeaters.
- Finally we'll consider an optimal pure ALERT2 system operating on a single frequency

ALERT message format

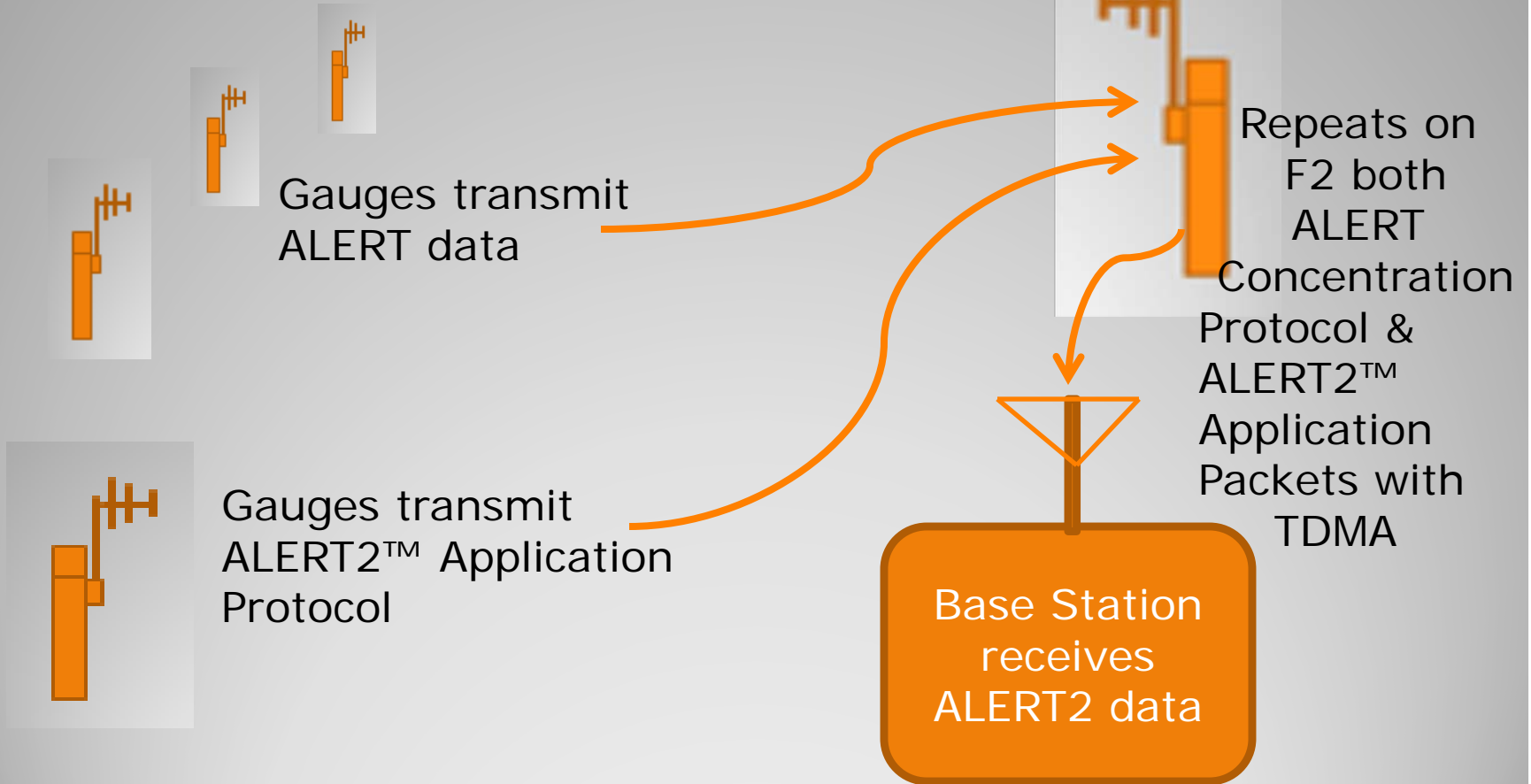
- Single messages typically are 313 milliseconds
- 180 milliseconds of RF warmup time
- 40 bits @ 300 baud is 133 milliseconds



- Let's Define some terms:

- TDMA – Time Division Multiple Access
- TDMA Frame Period: Defines the cycle of time being shared with other ALERT2 devices. Constraints include that it must be an integral multiple of the TDMA time slot, and evenly divisible into twelve hours.
Example – 15 Seconds.
- TDMA Time Slot: Defines the period of time assigned to an ALERT2 device. Example – 5 Seconds.
- TDMA Slot #: Declares which Time Slot within the TDMA Frame assigned to an ALERT2 device.
Example – 2. (2nd of 3 slots)

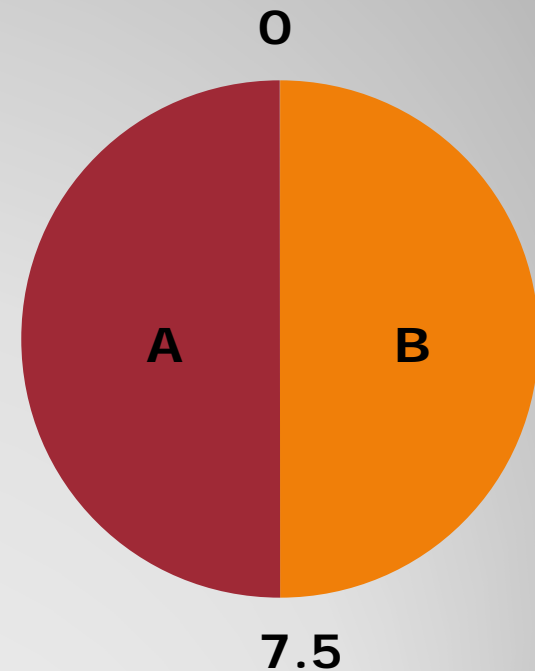
Dual Frequency Network with a full duplex Repeater, Receives both ALERT data and ALERT2™ on F1



- Two Repeaters into a Base Station:

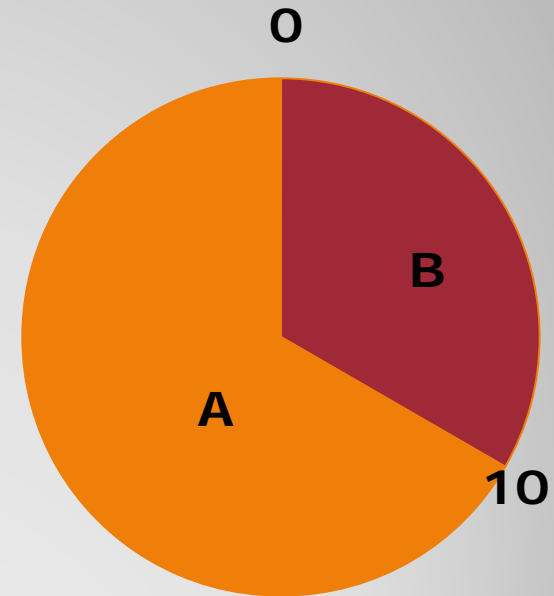
- Scenario #1: Both repeaters share the time equally

- Repeater A: Frame = 15 seconds
- Time Slot = 7.5 seconds
- Slot# = 1 (1 of 2)
- Repeater B: Frame = 15 seconds
- Time Slot = 7.5 seconds
- Slot# = 2 (2 of 2)



- Two Repeaters into a Base Station:

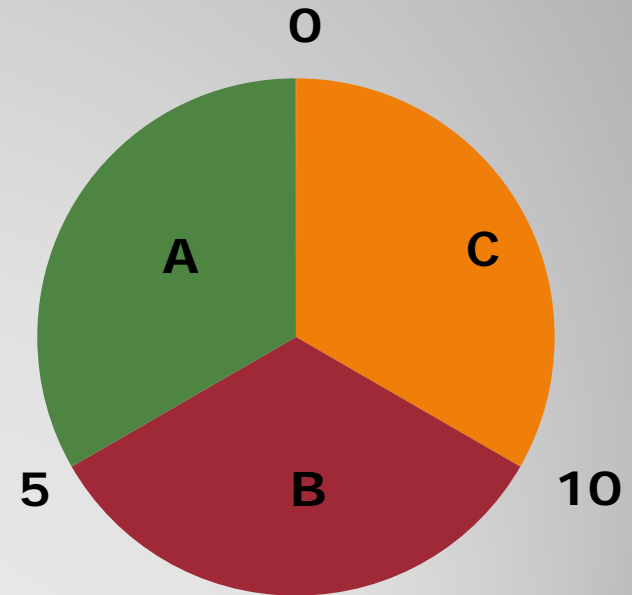
- Scenario #2: Both repeaters share the time **unequally**
 - Repeater A: Frame = 15 seconds
 - Time Slot = 10 seconds
 - Slot# = 1 (1 of 1)
 - Repeater B: Frame = 15 seconds
 - Time Slot = 5 seconds
 - Slot# = 3 (3 of 3)



- Three Repeaters into a Base Station:

- Scenario #1: All repeaters share the time equally

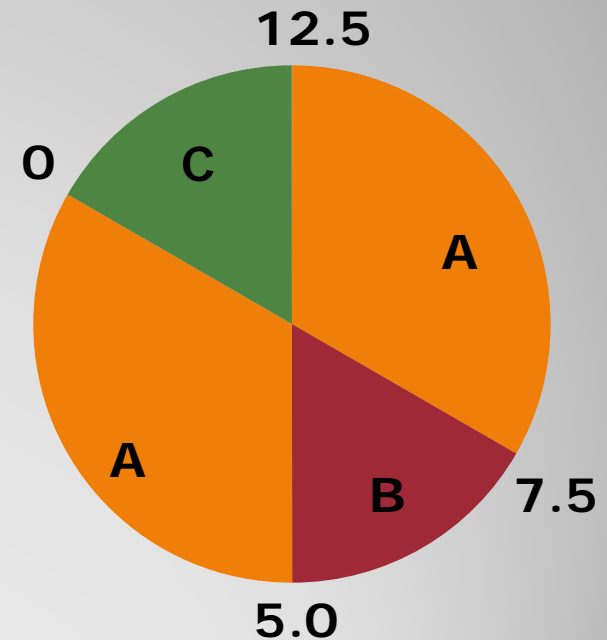
- Repeater A: Frame = 15 seconds
- Time Slot = 5 seconds
- Slot# = 1 (1 of 3)
- Repeater B: Frame = 15 seconds
- Time Slot = 5 seconds
- Slot# = 2 (2 of 3)
- Repeater C: Frame = 15 seconds
- Time Slot = 5 seconds
- Slot# = 3 (3 of 3)



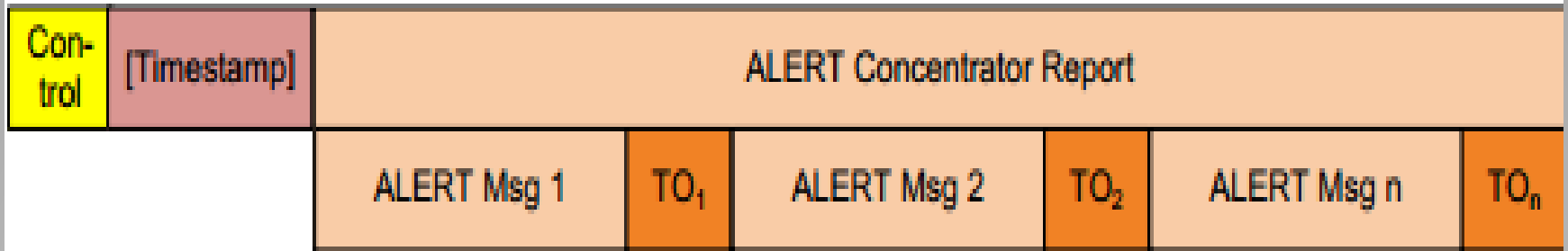
- Three Repeaters into a Base Station:

- Scenario #2: Repeaters share the time **unequally**

- Repeater A: Frame = 7.5 seconds
- Time Slot = 5 seconds
- Slot# = 1 (1 of 1)
- Repeater B: Frame = 15 seconds
- Time Slot = 2.5 seconds
- Slot# = 3 (3 of 6)
- Repeater C: Frame = 15 seconds
- Time Slot = 2.5 seconds
- Slot# = 6 (6 of 6)



Sending Legacy ALERT messages via a time slotted ALERT2™ Concentration protocol



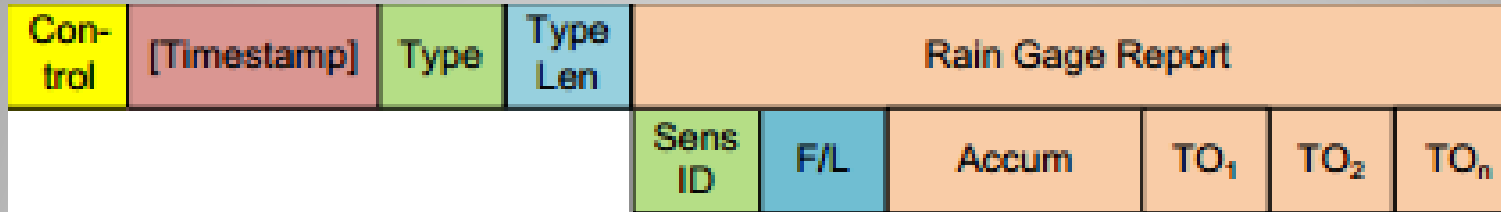
Timestamp is the time the message was sent.

Time offsets are the # of seconds the message was held prior to being transmitted

Concentrators might be assigned 3 second time slots in a 15 second frame

A single 2 second slot in a 15 second frame has a theoretical capacity of over 20,000 ALERT messages per hour

TIPPING BUCKET RAIN GAGE REPORT

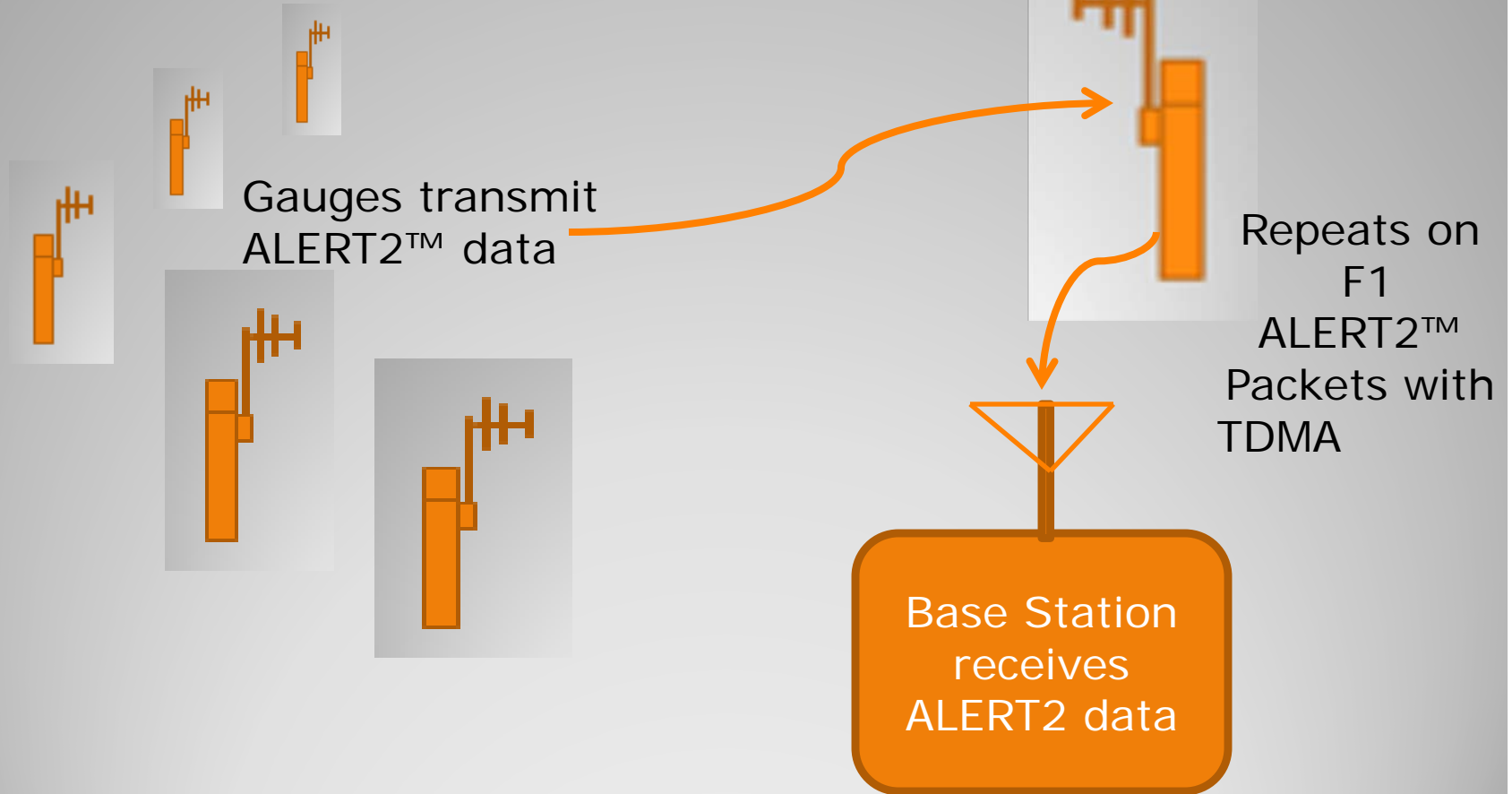


Format/Length of the accumulator to follow (Last total count of the Precip)

One or more time offsets detailing the time of the event before the packet arrived at the modulator board.

A timed report will have no offsets.

Single Frequency Network with a Simplex Repeater, Receives ALERT2™ on F1



- Optimal ALERT2™ Simplex System on a single frequency:
- Requirements Statement: Design a system where both the remote sites and the repeater share the same frequency channel.
- Up to 90 remote sites each operating in 0.5 second slots in a 60 second Frame.
- Repeater operates with a 7.5 second slot in a 30 second Frame.

- Optimal ALERT2™ Simplex System on a single frequency:
- 90 0.5 second Time slots in a 60 second Frame only consume 45 seconds.
- Two 7.5 second slots for the repeater will remain in a 60 second Frame.
- Repeater: Frame = 30 seconds
 - Time Slot = 7.5 seconds
 - Slot# = 4 (4 of 4)

- Optimal ALERT2™ Simplex System on a single frequency:

- Remote Gauges setup:

- TDMA: Frame = 60 seconds
- Time Slot = 0.5 seconds
- Slot# = 1 to 45 (out of 120)
- Slot# = 61 to 105 (out of 120)

- Repeater setup:

- Slots 46 through 60 and
- Slots 106 through 120 are
- reserved for the repeater

