Some Considerations on a Synchronous Frame

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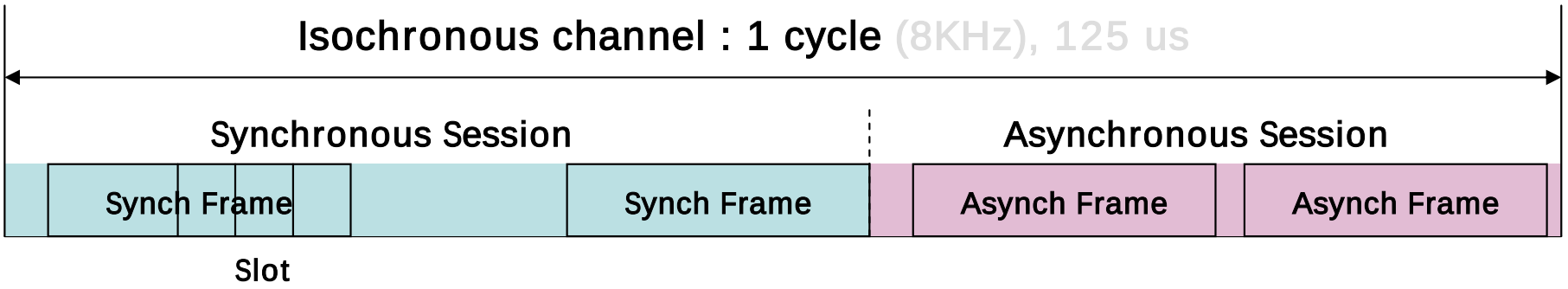
Isochronous Channel & Synchronous Frame



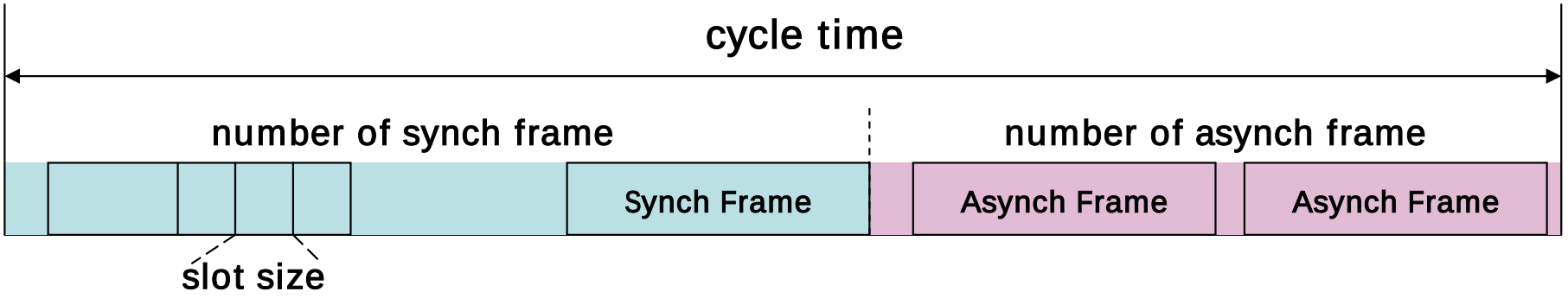
- Isochronous channel is specified by a synchronous frame
  - a communication stream transport that is uniform in time.
  - the delivery of the physical stream of information is recurring at regular intervals.

- Design considerations on a synchronous frame and synchronous session
  - cycle interval, frame size, number of frames in a cycle, slot size, ratio of synch & asynch frame
  - synchronization, frame identification, synch frame format, frame transmit and receive in a cycle
  - synchronous connection request & grant, assign & collect synchronous bandwidth
  - frame multiplexing, frame relaying, slot add/drop/exchange/switching

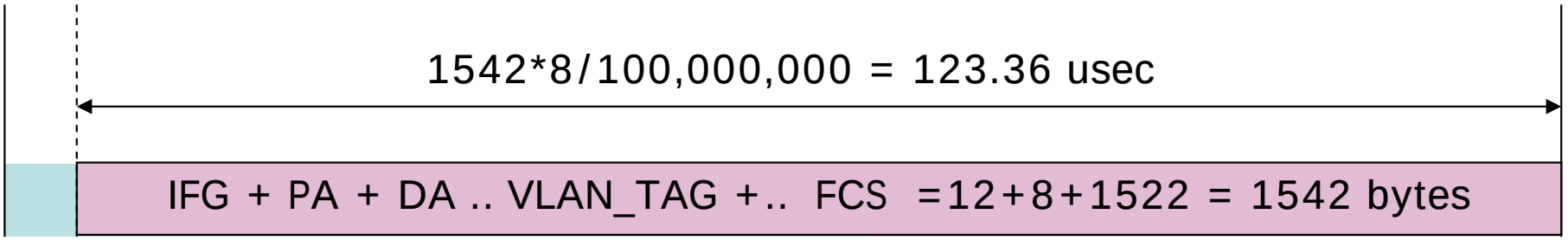
Requirements on synchronous frame

- RESG's objectives are general requirements
  - Large aggregate bandwidth (greater than or equal to 1G)
  - At least 75% of aggregate bandwidth available for isochronous traffic
  - At least 10% of aggregate bandwidth is reserved for best-effort traffic
  - Isochronous traffic only supported over 100Mb or greater full-duplex
  - Support arbitrary topologies within reasonable limits

- Size matter on synchronous frame
  - cycle interval
  - frame size
  - number of frames in a cycle
  - slot size
  - ratio of synch & asynch frame



Cycle and frame size on 100Mbps R-Ethernet



- Cycle = 125usec
  - For 1Gbps
    - 10% of Asynch traffic : OK
  - For 100Mbps
    - 123.36/125 = 98.688%
- Three schemes to satisfy 10%~25% bandwidth allocation to asynch
  - MTU reassignment
  - MAC frame segmentation
  - Cycle time of 10 * 125usec
- To preserve the max frame size, a cycle time should be 125*n usec
- Otherwise, it should be changed the asynch bandwidth allocation requirement of 10%

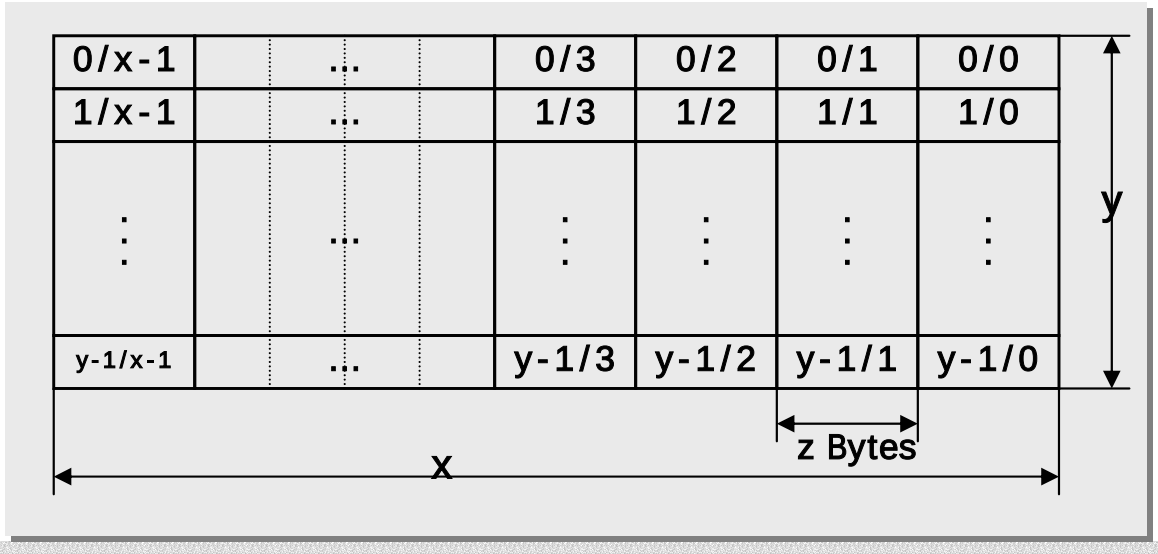
More requirements on synchronous frame

- Application oriented requirements
  - High quality Audio/Video backbone
  - Intelligent agents coordinated backbone
    - IT Robot at home, office
    - House keeping, edutainment, nursing, butler robot
    - Control & actuation, collaboration
  - Ubiquitous sensor network backbone
    - Sensing & actuation, collaboration
  - Time critical short message based command & control

- Size matter on synchronous frame
  - various ranges of transmit
  - 8Kbps : 1byte/500us
  - 2Mbps : 32bytes/125us

- Frame multiplexing
  - slot size : z
  - number of slot in a frame : x
  - number of cycle (multi frame) : y
  - max = 64Kbps*z*x
  - min = 64Kbps*z/y

x = 50, y = 16, z = 32bytes
max = 64Kbps × 32 × 50 = 102.4 Mbps
min = 64Kbps × 32 ÷ 16 = 128 Kbps



Conclusions

- Objectives of RESG are considered to be more open to broad and future applications

- Objective modification
  - At least 75% of aggregate bandwidth available for isochronous traffic
  - At least 10% of aggregate bandwidth is reserved for best-effort traffic

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  - Bandwidth can be reserved for isochronous traffic and best-effort traffic

  - Add an objective on bandwidth granularity for isochronous traffic ?