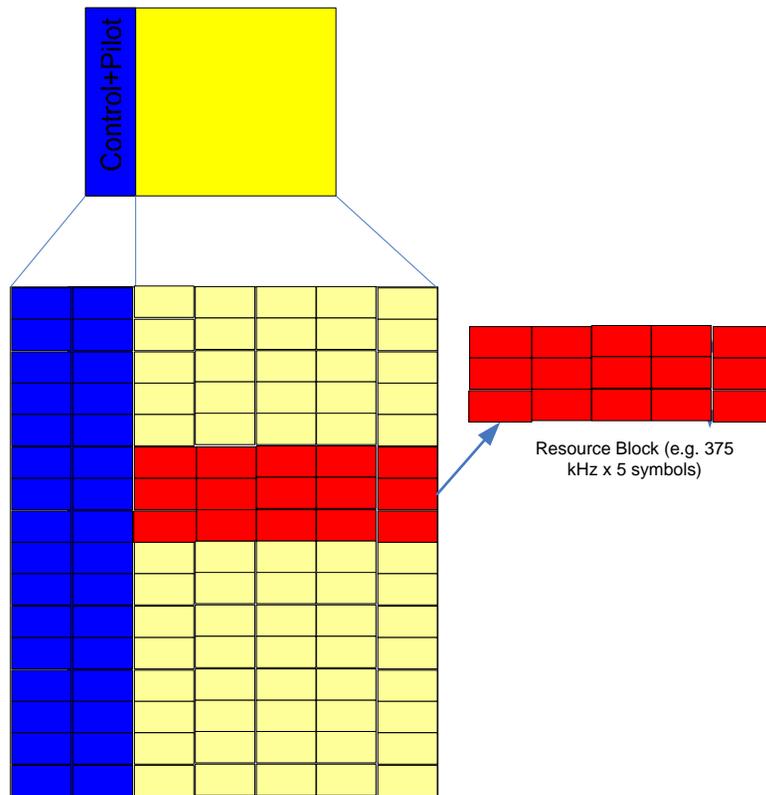


R2-060121 Resource Blocks and Resource Allocations/Assignments

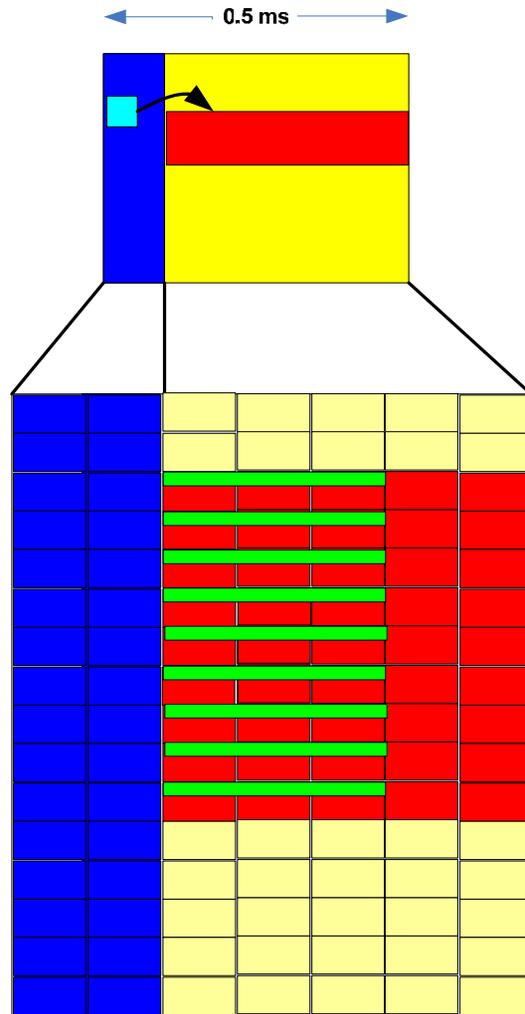
Motorola
Agenda Item 6.1

Resource Block



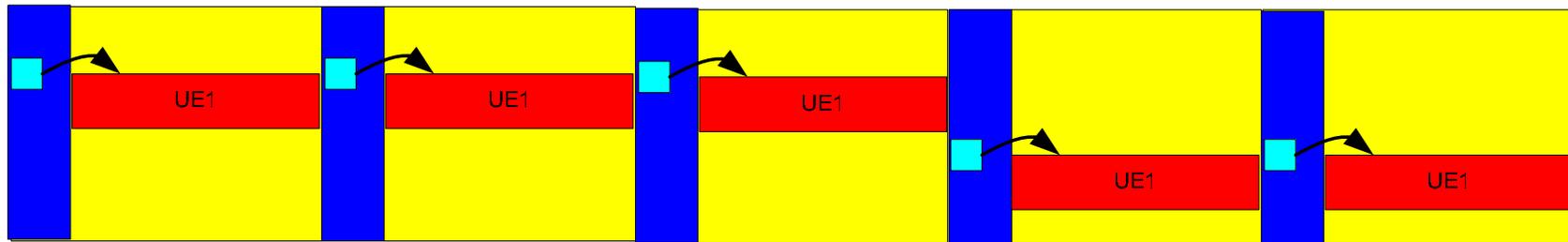
- A Resource Block consists of “M” number of consecutive sub-carriers over “N” number of consecutive symbols.
 - E.g. BW = 5 MHz, Freq, spacing = 15 kHz. Total sub-carriers ~ 300.
 - For M=25, each RB is then block of 25 contiguous sub-carriers over N=5 symbols.
- N can extend to the entire time domain i.e. N=7 for unicast, in which case all the channels – pilot, control, synch, etc. can be viewed as being mapped onto these Resource Blocks.

Resource Allocation/Resource Assignment



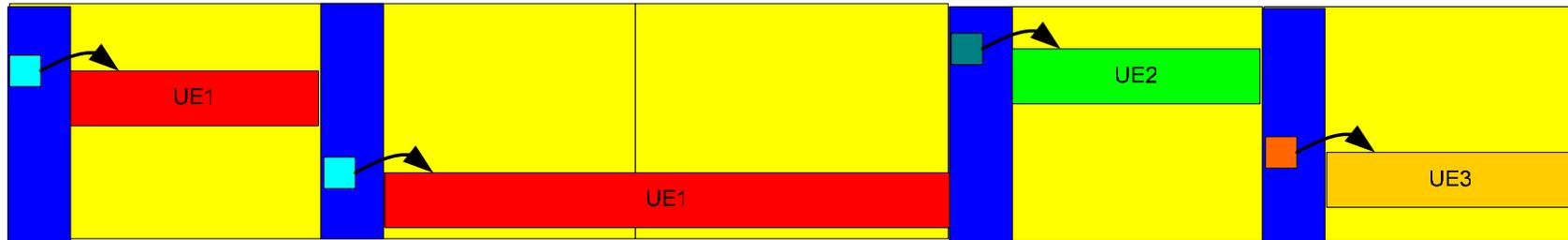
- E.g. A set of 3 Resource Blocks are mapped to a Transport Channel for a UE. The stream of bits represented by these Resource Blocks represent one Shared Physical Channel allocated to the UE in the representative Scheduling Occasion.
- The Resource Allocation/Assignment (the actual sub-carriers on which the data has been transmitted for this user) are represented by the green slivers in this Resource Block Super-set
 - for example, each green sliver represents every Nth sub-carrier of the individual Resource Block. Here we have a case of a FD allocation, where the assignment is only over 3 symbols.
- FS allocations may be a set of Resource Blocks, with FD allocations punctured out.
 - If $N = 7$, the pilot and control channels can also be viewed as being punctured out

Short Frame Allocations



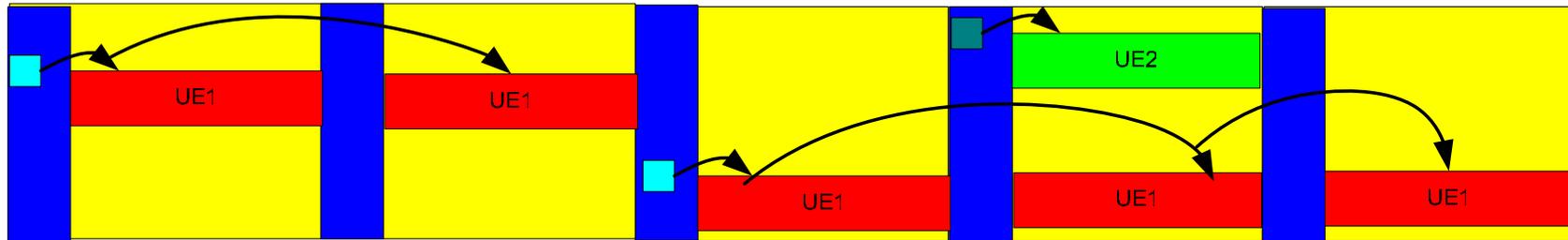
- **Figure illustrates consecutive short frame allocations to one UE**
 - Figure shows a FS allocation for illustrative purposes only
 - Applies to FD allocations as well

Long Frame Allocations



- **Long and Short Frame Allocations are not inter-mixed**
 - A subframe is either part of a Long Frame for **all** UEs or is a Short Frame for **all** UEs but NOT both simultaneously
 - Figure shows a FS allocation for illustrative purposes only
 - Applies to FD allocations as well

Simultaneous Long + Short Frame Allocations – Scheme 1

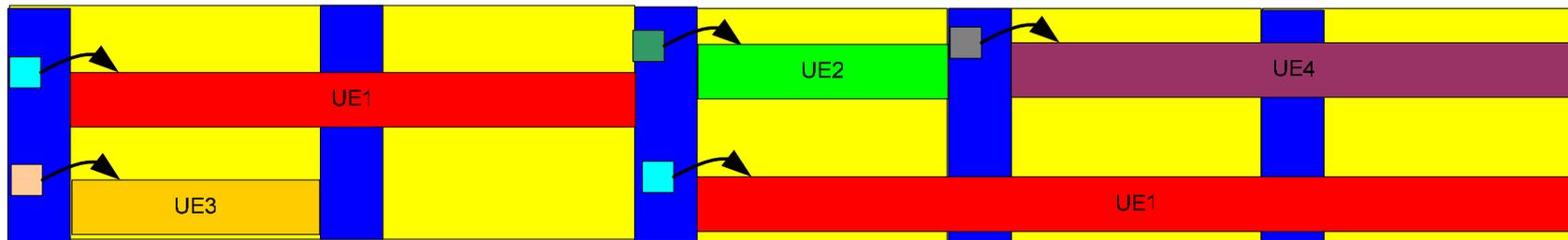


- **A UE is assigned Long Frame Allocations by mapping the control region of a sub-frame to multiple consecutive subframes**
 - Signaling can be implicit or explicit
 - Can be non-consecutive subframes as well (potentially requiring explicit signaling)
- **The same stream of subframes can provide Short and Long Allocations to different UEs**

In figure above, UE1 has been assigned a Long Frame Allocation; UE2 has been assigned a Short Frame Allocation.

- **The control and pilot regions of the individual sub-frames are not punctured to provide additional payload resource for the Long Allocations running along the subframe**
- **Allows for interleaving of control region in the subframes potentially providing more shared control channel reliability**

Simultaneous Long + Short Frame Allocations – Scheme 2



- Different UEs can be assigned Long and Short Allocations
- A given subframe acts as a portion of a Short or Long Allocation simultaneously
 - For the same UE
 - For different UEs
- Control Region is not punctured allowing for inter-mixing of Short and Long allocations within a subframe
 - No interleaving/limited interleaving of control region possibleThus UE4 can be assigned a Long Frame Allocation in the middle of a Long Frame assigned to UE1.

Resource Blocks and Resource Assignments

- **Large number of unit-sized resources in LTE**
 - Gets worse larger the bandwidth
 - Useful to define minimum sized resource entities to permit lowering of signaling complexity
- **Different possibilities exist for frame constructs for resource assignments**
- **Need to look at overall system performance and use case scenarios to understand the pros and cons of the different constructs**