

```

TimingSpecification BBW {

    Dimension physicalTime {
        Units { micros{factor 1.0 offset 0.0},
                ms{factor 100.0 offset 0.0 reference micros},
                second{factor 1000000.0 offset 0.0 reference micros}
            }
    }

    }

    TimeBase universal_time {
        dimension physicalTime
        precisionFactor 0.1
        precisionUnit micros
    }

    Event brakePedalSensorActivation {} // attached to 'EISignal'
        // port on 'BrakePedalSensor' component

    Event positionPercent {} // attached to 'PositionPercent'
        // port on 'BrakePedalSensor' component

    Event pedalPercent {} // attached to 'PedalPercent' port on
        // 'BrakeTorqueCalculator' component

    Event globalTorque {} // attached to 'GlobalTorque' port on
        // 'GlobalBrakeController' component

    Event firstWheelSensorAcquisition {} // attached to 'Ticks'
        // port on 'RRWS' component
    Event secondWheelSensorAcquisition {} // attached to 'Ticks'
        // port on 'RLWS' component
    Event thirdWheelSensorAcquisition {} // attached to 'Ticks'
        // port on 'FRWS' component
    Event fourthWheelSensorAcquisition {} // attached to 'Ticks'
        // port on 'FLWS' component

    Event firstWheelSpeedRPM {} // attached to 'SpeedRPM' port on
        // 'RRWS' component
    Event secondWheelSpeedRPM {} // attached to 'SpeedRPM' port
        // on 'RLWS' component
    Event thirdWheelSpeedRPM {} // attached to 'SpeedRPM' port on
        // 'FRWS' component
    Event fourthWheelSpeedRPM {} // attached to 'SpeedRPM' port
        // on 'FLWS' component

```

```
Event firstWheel_rpm {} // attached to 'RRW_rpm' port on
                        // 'GBC' component
Event secondWheel_rpm {} // attached to 'RLW_rpm' port on
                        // 'GBC' component
Event thirdWheel_rpm {} // attached to 'FRW_rpm' port on
                        // 'GBC' component
Event fourthWheel_rpm {} // attached to 'FLW_rpm' port on
                        // 'GBC' component

Event torqFirstWheel {} // attached to 'TRRW' port on 'GBC'
                        // component
Event torqSecondWheel {} // attached to 'TRLW' port on 'GBC'
                        // component
Event torqThirdWheel {} // attached to 'TFRW' port on 'GBC'
                        // component
Event torqFourthWheel {} // attached to 'TRLW' port on 'GBC'
                        // component

Event firstWheelRequestedTorque {} // attached to
                        //'RequestedTorq' port on
                        //'ABSrrw' component
Event secondWheelRequestedTorque {} // attached to
                        //'RequestedTorq' port on
                        //'ABSrlw' component
Event thirdWheelRequestedTorque {} // attached to
                        //'RequestedTorq' port on
                        //'ABSfrw' component
Event fourthWheelRequestedTorque {} // attached to
                        //'RequestedTorq' port on
                        //'ABSflw' component

Event firstWheelABSBrakeTorque {} // attached to
                        // 'ABSBrakeTorque' port on
                        // 'ABSrrw' component
Event secondWheelABSBrakeTorque {} // attached to
                        // 'ABSBrakeTorque' port on
                        // 'ABSrlw' component
Event thirdWheelABSBrakeTorque {} // attached to
                        // 'ABSBrakeTorque' port on
                        // 'ABSfrw' component
Event fourthWheelABSBrakeTorque {} // attached to
                        // 'ABSBrakeTorque' port on
                        // 'ABSflw' component

Event firstWheelTorqCmd {} // attached to 'TorqCmd' port on
                        // 'RearRightBrake' component
Event secondWheelTorqCmd {} // attached to 'TorqCmd' port on
                        // 'RearLeftBrake' component
```

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Event thirdWheelTorqCmd {} // attached to 'TorqCmd' port on
                          // 'FrontRightBrake' component
Event fourthWheelTorqCmd {} // attached to 'TorqCmd' port on
                          // 'FrontLeftBrake' component

Event firstWheelBrakeActuation {} // attached to 'EISignal'
                                  // port on 'RearRightBrake' component
Event secondWheelBrakeActuation {} // attached to 'EISignal'
                                  // port on 'RearLeftBrake' component
Event thirdWheelBrakeActuation {} // attached to 'EISignal'
                                  // port on 'FrontRightBrake' component
Event fourthWheelBrakeActuation {} // attached to 'EISignal'
                                  // port on 'FrontLeftBrake' component

EventChain ec1 {
  stimulus brakePedalSensorActivation
  response firstWheelBrakeActuation
  eventChains ecla, eclb, eclc, ecld, ecle, eclf, eclg
}

EventChain ecla {
  stimulus brakePedalSensorActivation
  response positionPercent
}

EventChain eclb {
  stimulus positionPercent
  response pedalPercent
}

EventChain eclc {
  stimulus pedalPercent
  response globalTorque
}

EventChain ecld {
  stimulus globalTorque
  response torqFirstWheel
}

EventChain ecle {
  stimulus torqFirstWheel
  response firstWheelABSBrakeTorque
}

EventChain eclf {
  stimulus firstWheelABSBrakeTorque
  response firstWheelTorqCmd
}

```

```
EventChain ec1g {
  stimulus firstWheelTorqCmd
  response firstWheelBrakeActuation
}

EventChain ec2 {
  stimulus brakePedalSensorActivation
  response secondWheelBrakeActuation
  eventChains ec1a, ec1b, ec1c, ec2d, ec2e, ec2f, ec2g
}

EventChain ec2d {
  stimulus globalTorque
  response torqSecondWheel
}

EventChain ec2e {
  stimulus torqSecondWheel
  response secondWheelABSBrakeTorque
}

EventChain ec2f {
  stimulus secondWheelABSBrakeTorque
  response secondWheelTorqCmd
}

EventChain ec2g {
  stimulus secondWheelTorqCmd
  response secondWheelBrakeActuation
}

EventChain ec3 {
  stimulus brakePedalSensorActivation
  response thirdWheelBrakeActuation
  eventChains ec1a, ec1b, ec1c, ec3d, ec3e, ec3f, ec3g
}

EventChain ec3d {
  stimulus globalTorque
  response torqThirdWheel
}

EventChain ec3e {
  stimulus torqThirdWheel
  response thirdWheelABSBrakeTorque
}

EventChain ec3f {
  stimulus thirdWheelABSBrakeTorque
  response thirdWheelTorqCmd
}
```

```
EventChain ec3g {
  stimulus thirdWheelTorqCmd
  response thirdWheelBrakeActuation
}

EventChain ec4 {
  stimulus brakePedalSensorActivation
  response fourthWheelBrakeActuation
  eventChains ec1a, ec1b, ec1c, ec4d, ec4e, ec4f, ec4g
}

EventChain ec4d {
  stimulus globalTorque
  response torqFourthWheel
}

EventChain ec4e {
  stimulus torqFourthWheel
  response fourthWheelABSBrakeTorque
}

EventChain ec4f {
  stimulus fourthWheelABSBrakeTorque
  response fourthWheelTorqCmd
}

EventChain ec4g {
  stimulus fourthWheelTorqCmd
  response fourthWheelBrakeActuation
}

EventChain ec5 {
  stimulus firstWheelSensorAcquisition
  response firstWheelBrakeActuation
  eventChains ec5a, ec5b, ec5c, ec1e, ec1f, ec1g
}

EventChain ec5a {
  stimulus firstWheelSensorAcquisition
  response firstWheelSpeedRPM
}

EventChain ec5b {
  stimulus firstWheelSpeedRPM
  response firstWheel_rpm
}

EventChain ec5c {
  stimulus firstWheel_rpm
  response torqFirstWheel
}
```

```
EventChain ec6 {
  stimulus secondWheelSensorAcquisition
  response secondWheelBrakeActuation
  eventChains ec6a, ec6b, ec6c, ec1e, ec1f, ec1g
}

EventChain ec6a {
  stimulus secondWheelSensorAcquisition
  response secondWheelSpeedRPM
}

EventChain ec6b {
  stimulus secondWheelSpeedRPM
  response secondWheel_rpm
}

EventChain ec6c {
  stimulus secondWheel_rpm
  response torqSecondWheel
}

EventChain ec7 {
  stimulus thirdWheelSensorAcquisition
  response thirdWheelBrakeActuation
  eventChains ec7a, ec7b, ec7c, ec1e, ec1f, ec1g
}

EventChain ec7a {
  stimulus thirdWheelSensorAcquisition
  response thirdWheelSpeedRPM
}

EventChain ec7b {
  stimulus thirdWheelSpeedRPM
  response thirdWheel_rpm
}

EventChain ec7c {
  stimulus thirdWheel_rpm
  response torqThirdWheel
}

EventChain ec8 {
  stimulus fourthWheelSensorAcquisition
  response fourthWheelBrakeActuation
  eventChains ec8a, ec8b, ec8c, ec1e, ec1f, ec1g
}

EventChain ec8a {
  stimulus fourthWheelSensorAcquisition
  response fourthWheelSpeedRPM
}
```

```

EventChain ec8b {
  stimulus fourthWheelSpeedRPM
  response fourthWheel_rpm
}

EventChain ec8c {
  stimulus fourthWheel_rpm
  response torqFourthWheel
}

var X1min ms on universal_time := 180.0
var X1max ms on universal_time := 200.0
var X2min ms on universal_time := 0.0
var X2max ms on universal_time := 15.0
var X3 ms on universal_time := 10.0
var X4min ms on universal_time := 1.5
var X4max ms on universal_time := 2.0
var X5min ms on universal_time := (X1min*0.40)
var X5max ms on universal_time := (X1max*0.40)
var X6 ms on universal_time := 50.0
var X7min ms on universal_time := 1.5
var X7max ms on universal_time := 2.0
var X8 ms on universal_time := 15.0
var X9 ms on universal_time := 5.0
var X10 ms on universal_time := 5.0

DelayConstraint tc1a {
  source brakePedalSensorActivation
  target firstWheelBrakeActuation
  lower = X1min
  upper = X1max
}

DelayConstraint tc1b {
  source brakePedalSensorActivation
  target secondWheelBrakeActuation
  lower = X1min
  upper = X1max
}

DelayConstraint tc1c {
  source brakePedalSensorActivation
  target thirdWheelBrakeActuation
  lower = X1min
  upper = X1max
}

DelayConstraint tc1d {
  source brakePedalSensorActivation
  target fourthWheelBrakeActuation
  lower = X1min
}

```

```

    upper = X1max
}

DelayConstraint tc2a {
    source firstWheelSensorAcquisition
    target firstWheelSpeedRPM
    lower = X2min
    upper = X2max
}

DelayConstraint tc2b {
    source secondWheelSensorAcquisition
    target secondWheelSpeedRPM
    lower = X2min
    upper = X2max
}

DelayConstraint tc2c {
    source thirdWheelSensorAcquisition
    target thirdWheelSpeedRPM
    lower = X2min
    upper = X2max
}

DelayConstraint tc2d {
    source fourthWheelSensorAcquisition
    target fourthWheelSpeedRPM
    lower = X2min
    upper = X2max
}

RepeatConstraint tc3a {
    event firstWheelSensorAcquisition
    span = 1
    lower = X3
    upper = X3
}

RepeatConstraint tc3b {
    event secondWheelSensorAcquisition
    span = 1
    lower = X3
    upper = X3
}

RepeatConstraint tc3c {
    event thirdWheelSensorAcquisition
    span = 1
    lower = X3
    upper = X3
}

```



```
RepeatConstraint tc3d {
    event fourthWheelSensorAcquisition
    span = 1
    lower = X3
    upper = X3
}
```

```
DelayConstraint tc4a {
    source firstWheelSpeedRPM
    target firstWheel_rpm
    lower = X4min
    upper = X4max
}
```

```
DelayConstraint tc4b {
    source secondWheelSpeedRPM
    target secondWheel_rpm
    lower = X4min
    upper = X4max
}
```

```
DelayConstraint tc4c {
    source thirdWheelSpeedRPM
    target thirdWheel_rpm
    lower = X4min
    upper = X4max
}
```

```
DelayConstraint tc4d {
    source fourthWheelSpeedRPM
    target fourthWheel_rpm
    lower = X4min
    upper = X4max
}
```

```
DelayConstraint tc5a {
    source firstWheel_rpm
    target torqFirstWheel
    lower = X5min
    upper = X5max
}
```

```
DelayConstraint tc5b {
    source secondWheel_rpm
    target torqSecondWheel
    lower = X5min
    upper = X5max
}
```

```
DelayConstraint tc5c {
    source thirdWheel_rpm
    target torqThirdWheel
}
```

```
    lower = X5min  
    upper = X5max  
}
```

```
DelayConstraint tc5d {  
    source fourthWheel_rpm  
    target torqFourthWheel  
    lower = X5min  
    upper = X5max  
}
```

```
DelayConstraint tc6a {  
    source torqFirstWheel  
    target firstWheelABSBrakeTorque  
    lower = 0.0  
    upper = X6  
}
```

```
DelayConstraint tc6b {  
    source torqSecondWheel  
    target secondWheelABSBrakeTorque  
    lower = 0.0  
    upper = X6  
}
```

```
DelayConstraint tc6c {  
    source torqThirdWheel  
    target thirdWheelABSBrakeTorque  
    lower = 0.0  
    upper = X6  
}
```

```
DelayConstraint tc6d {  
    source torqFourthWheel  
    target fourthWheelABSBrakeTorque  
    lower = 0.0  
    upper = X6  
}
```

```
DelayConstraint tc7a {  
    source firstWheelABSBrakeTorque  
    target firstWheelTorqCmd  
    lower = X7min  
    upper = X7max  
}
```

```
DelayConstraint tc7b {  
    source secondWheelABSBrakeTorque  
    target secondWheelTorqCmd  
    lower = X7min  
    upper = X7max  
}
```

```

DelayConstraint tc7c {
    source thirdWheelABSBrakeTorque
    target thirdWheelTorqCmd
    lower = X7min
    upper = X7max
}

DelayConstraint tc7d {
    source fourthWheelABSBrakeTorque
    target fourthWheelTorqCmd
    lower = X7min
    upper = X7max
}

DelayConstraint tc8a {
    source firstWheelTorqCmd
    target firstWheelBrakeActuation
    lower = 0.0
    upper = X8
}

DelayConstraint tc8b {
    source secondWheelTorqCmd
    target secondWheelBrakeActuation
    lower = 0.0
    upper = X8
}

DelayConstraint tc8c {
    source thirdWheelTorqCmd
    target thirdWheelBrakeActuation
    lower = 0.0
    upper = X8
}

DelayConstraint tc8d {
    source fourthWheelTorqCmd
    target fourthWheelBrakeActuation
    lower = 0.0
    upper = X8
}

SynchronizationConstraint tc9 {
    events firstWheel_rpm, secondWheel_rpm,
           thirdWheel_rpm, fourthWheel_rpm

    tolerance = X9
}

SynchronizationConstraint tc10 {
    events firstWheelBrakeActuation,

```

```
        secondWheelBrakeActuation,  
        thirdWheelBrakeActuation,  
        fourthWheelBrakeActuation  
    }  
    tolerance = X10  
}  
} //end of TimingSpecification BBW
```