CACC Performance Analysis

**Background**
- Field Test of Cooperative Adaptive Cruise Control (CACC) on Transport Canada testy track for a variety of scenarios
- Data analysis conducted fuel consumption and CACC system performance with respect to those scenarios

**Field Test Scenarios**
- Fuel Saving Due to Aerodynamic Drag Reduction
- CACC speed and distance tracking error (or string stability) depends on speed changes: larger speed variation has larger tracking errors
- Constant T-Gap (D-Gap) following has reasonably good performance
- Consistent with the evaluation method using J-Bus fuel rate data

**Performance Parameters**
- Root Mean Square Error for both speed and distance tracking
- Maximum and Minimum Tracking Error

**Conclusion**
- Truck CACC showed significant energy savings for followers
- Leader also got fuel savings as D-Gap lowered below 12m
- D-Gap > 12m reduce more than 50% fuel consumption
- D-Gap > 10m while 2 m more
- Consistent with the evaluation method using J-Bus fuel rate data

**Fuel Saving Due to Aerodynamic Drag Reduction**
- Aerodynamic treatment with side skirts and boat tail
- Trailer aerodynamic treatment with boat tail and side skirt

**Table 1**
- Statistics of speed and distance tracking error for Cut-in between 1 & 2
- Speed Variation 35 mph [2.2 m/s] T-Gap 1.2 s [30 m]
- Veh ID 1 & 2 T-Gap 1.2 s [30 m]

**Table 2**
- Statistics of speed and distance tracking error for Cut-in between 2 & 3
- Speed Variation 35 mph [2.2 m/s] T-Gap 1.2 s [30 m]
- Veh ID 1 & 2 T-Gap 1.2 s [30 m]

**Table 3**
- Statistics of speed and distance tracking error for 4m D-Gap
- Speed Variation 35 mph [2.2 m/s] T-Gap 1.2 s [30 m]
- Veh ID 1 & 2 T-Gap 1.2 s [30 m]

**Table 4**
- Statistics of speed and distance tracking error for 6m D-Gap
- Speed Variation 35 mph [2.2 m/s] T-Gap 1.2 s [30 m]
- Veh ID 1 & 2 T-Gap 1.2 s [30 m]

**Table 5**
- Statistics of speed and distance tracking error for 8m D-Gap
- Speed Variation 35 mph [2.2 m/s] T-Gap 1.2 s [30 m]
- Veh ID 1 & 2 T-Gap 1.2 s [30 m]