Subject: Train Detection and Train Protection
Posted by Gregor.Theeg on Fri, 01 Oct 2004 10:16:24 GMT
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Dear railML partners,

the basic difference between detectors and train protection elements is the following:
Detection elements detect a wheel/axle, vehicle or obstacle and give information from the train to the infrastructure (signal box). The signal box uses this information for proving a track free (axle counters, track circuits) or for switching purposes (e.g. switching a level crossing on/of, release or approach locking of routes etc.
Train protection elements (such as balises, trackside magnets or mechanical barriers (which are still in use at Berlin S-Bahn) are actors; they give information from the infrastructure to the train, e.g. order to brake immediately.
Based on this difference, we should divide the "small things along the track" into 2 containers: "detectionElements" and "trainProtectionElements".

"detectionElements" can contain 0...many elements "detector" and "trackCircuitChange" and maybe more others in later versions.

Althought in most (not in all) cases there are different forms of detectors used for axle counting and for activating a level crossing and they must meet different requests, principally they are all the same thing, which means that in line schema they shall be the same type of element with different attributes. Only the signal box makes the one an axle counter and the other a switching-device, sometimes the information from one detector is used for several purposes, so the detector is both.
I suggest the following (mostly not-required) attributed:
- The ID and positioning attributes we already have.
- The kind of detected object, e.g. wheel, vehicle (=railway vehicle), obstacle (including road vehicles), end of train. Axle counters must detect wheels, for switching on a level crossing sometimes induction loops (which are vehicle detectors) are used.
-The technical principle, e.g. mechanical, hydraulic, pneumatic, magnetic, inductive and optical. Most modern forms are inductive, but optical forms are increasingly used, especially for obstacle detection, and at Innotrans 2004 I even saw a modern mechanical detector!
- Position: Wheel detectors can be at right or left rail, vehicle and obstacle detectors between or ...meters right or left from the rails.
- Detection of direction ("true"/"false"): Today detectors used for axle counting always have to distinguish directions.
- Type (Bauform; according to the producer)
- Information, if this detector is used for axle counting ("true"/"false"). Sometimes in layout maps we want to draw all "axle

counters".

Track circuits are detectors that are no point, but have a length. In our definition we should clearly distinguish between the track circuit and the limit of a track circuits (e.g. insulated rail joint). The attributes "length" and "frequency" refer to the track circuit, not to its limit.
Because of the functional analogy between an axle counting point and an insulated rail joint (limiting track sections to be proven free) I would put the trackCircuitChange into the container "detectionElements", although they are no detector. Because of the same analogy between track circuits (a physical element which actually belongs into line schema) and axle counting circuits (a logical thing which actually belongs into interlocking schema) I like to have both of them at the same position in railML DTD. Thus, we should leave the track circuit (not the trackCircuitChange!) out for the moment (which means in version 1.0) and think about this problem later during the development of interlocking schema.
trackCircuitChanges I would like to give additional attributes:
- If the right, left, both or no rail is insulated. No rail for insulated-rail-joint-free track circuits.
- If at upper, lower or both sides there is a track circuit.

"trainProtectionElements" in most cases are a "tracksideMagnet" or a "balise". A trackside magnet can also be a combination of 2 magnets, e.g. Signum. The basic difference is that a trackside magnet submits only its condition (1 bit), e.g. "I'm under alternate current 1000 Hz" or "I'm under direct current with polarity ...", whereas a balise submits a data telegram. Additional attributes should be the system, e.g. "PZB90", "Signum", "ZUB123", "ETCS Level1", "Crocodile",...; and the type of the element (Bauform).