I thought the usage was meant like that:

dir:
is a general attribute that means, the km-point is valid for this
direction. A mileageChange should allways be valid in "both" directions.
In comparison, a signal is seen in only one direction.

pos:
is the distance relative to the start of the track, as in your assumption
1

absPos:
this is the absolute position, this means the km value written on the sign
beside the track. Or it is the starting value on your maesuring tape,
beginning at this point, being valid for the next part of the track. (not
as in your assumption 2)

absPosIn:
this should be the incoming mileage (the correct one, according to the
previous measuring tape) that could be different from the one, standing on
the sign beside the track. (not as in your assumption 2)

the direction of a mileage must be derived by "absPos"" and "absPosIn" of
the next mileageChange along the track. This direction attribute is
missing (and not the one in your 3rd assumption)

Maybe Ulrich could clear up the correct usage of the mileageChange
element.

Best regards,
Joachim