Detailed Rollover Algorithm

Background

The detailed proposal below builds upon MCCP053 and In Appendix 1 to MCCP053 ("Detailed User Requirements for the Enduring Rollover Solution") to provide a detailed rollover algorithm which would identify one of three possibilities:
- Not a Rollover;
- Rollover; or
- Indeterminate.

Summary of Algorithm

Detailed consideration of the tests below, show that the cases of *Rollover* and *Not a Rollover* are distinct (except for choices of parameters which would not chosen in practice). It is therefore proposed that the algorithm should work in the following order:

- Not a Rollover;
- Rollover; or
- Indeterminate.

which is different from that proposed in MCCP053 and Appendix 1 to MCCP053

Identification of a Not a Rollover
The algorithm for identification of not a Rollover comprises a test which is configurable through a small number of parameters

Identification of a Rollover
The algorithm for identification of a Rollover will comprise
- The options will include the ability to use (or not use) the current "99xx","00xx" test; or
- Several tests;
    o Which are configurable through:
        ▪ Variables which indicate whether each test is applied or not;
        ▪ Parameters which apply to each of the tests;
        ▪ And all the applicable tests must be passed.

Identification of Indeterminate
Comprises all other cases not identified as either a *Not a Rollover or Rollover.*

The parameters will be written to a configuration file. These are expected to be changed infrequently, with changes being documented to Trading Parties at the CSD level. An automatic logging system is not therefore required for changes to this configuration file.

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Terminology

The following terminology is used:

		Previous Read	Candidate Read	
Reads	R_{-2}	R_{-1}	R_0	R_1
Advances	A_{-2}	A_{-1}	A_0	
Daily Rates Of Advance	DRA_{-2}	DRA_{-1}	DRA_0	

The new candidate read R_1 will always exist.
The most recent previous read is R_0, and may or may not exist.
If R_0 exists, the second most previous read is R_{-1} and may or may not exist.
If R_{-1} exists, the third most previous read is R_{-2} and may or may not exist.

Similarly the advances between the reads A_{-2}, A_{-1} and A_0, may or may not exist. The advance A_0 will be calculated for the purposes of this algorithm on the assumption that a rollover has taken place between the reads is R_0 and R_{-1},

Corresponding to the advances A_{-2}, A_{-1} and A_0, the Daily Rates of Advance DRA_{-2}, DRA_{-1} and DRA_0 are calculated taking account of the number of days between the dates of the reads, but taking no account of either vacancy or temporary disconnection.

The number of dial digits on the meter is n.

Outline Algorithm

The Rollover Detection Algorithm first carries out the tests for the state:
- Not a Rollover;

Those reads which have failed the first test: "Not a Rollover", are then tested for the state
- Rollover.

Any reads which fail both the "Not a Rollover" and the "Rollover" tests are classified as
- Indeterminate

The algorithms below contain a number of configurable parameters. For the avoidance of doubt, while these parameters can be altered – they are subject to formal change control, and will be as specified within this CSD.

Not A Rollover
In order for the Rollover Detection Algorithm to return the state of "Not Rollover" the following conditions must be met.

Either:
R_0 does not exist (ie this is a first read) ;
or
$R_1 - R_0 > - (Q_1 + Q_2 * 10^n)$

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Where Q_1 and Q_2 are configurable parameters as specified below.

Rollover

In order for the Rollover Detection Algorithm to return the state "Rollover" the following condition must be met[1]:

Rollover = { (*UseTestOriginal* and (Passes Original Rollover Algorithm)) }
            OR
            {
                [(Not *UseTest1*) or (Passes Test 1)] AND
                [(Not *UseTest2*) or (Passes Test 2)] AND
                [(Not *UseTest3*) or (Passes Test 3)] AND
                [(Not *UseTest4*) or (Passes Test 4)] AND
                [(Not *UseTest5*) or (Passes Test 5)]   }

where
- *UseTestOriginal*
- *UseTest1*
- *UseTest2*
- *UseTest3*
- *UseTest4*
- *UseTest5*

are configurable parameters indicating whether the subtests:
- Original Rollover Algorithm
- Test 1
- Test 2
- Test 3
- Test 4
- Test 5

are applied or not

These sub tests are defined as follows:

Original Rollover algorithm:
- R_0 and R_1 exist;
- $R_0 >= 99 * 10^{n-2}$; and
- $R_1 < 10^{n-2}$

Test 1
- R_0 and R_1 exist;

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[1] Note: This expression for Rollover assumes that at least one of the variables *UseTest1* ..*UseTest5* is set to be True. In the unlikely event that all of these variables were selected to be False (ie a move back to the original test for rollover), the expression for Rollover would have to be rewritten; as otherwise the expression as written always returns the result True.

- $R_0 \geq V_0 * 10^{n-2}$
- R_0 is *Not a Rollover*
- $R_1 < V_1 * 10^{n-2}$

where V_0 and V_1 are configurable parameters (integers).

Test 2

- R_{-1}, R_0 and R_1 exist
- R_{-1} is *Not a Rollover*
- R_0 is *Not a Rollover*
- Plow * $DRA_{-1} < DRA_0 < Phigh * DRA_{-1}$

Where Plow and Phigh are configurable proportions (specified as a decimal with up to two decimal places) – for example 0.2 and 2.0.

In calculating Test 2 it will be assumed that a rollover has taken place for the purposes of determining DRA_0. However, this assumption is specific to this Test 2, and will not affect any other setting or determination of the rollover flag associated with the meter read R_0.

Test 3

- R_0 and R_1 exist
- R_0 is *Not a Rollover*
- $10^n + R_1 - R_0 < P_1 * 10^n$

where P_1 is a configurable parameter (specified as a decimal with up to two decimal places).

Test 4

- R_{-1} and R_0 to exist
- R_{-1} is *Not a Rollover*
- R_0 is *Not a Rollover*
- $R_0 - R_{-1} < P_2 * 10^n$

where P_2 is a configurable parameter (specified as a decimal with up to two decimal places).

Test 5

- R_{-2} and R_{-1} exist
- R_{-2} is *Not a Rollover*
- R_{-1} is *Not a Rollover*
- $R_{-1} - R_{-2} < P_3 * 10^n$

where P_3 is a configurable parameter (specified as a decimal with up to two decimal places) .

Indeterminate
The Rollover Detection Algorithm will return the state "Indeterminate" if the meter reads do not fall into either of the states "Not a Rollover" or "Rollover".

Parameters

The CMA will set the Rollover Detection Algorithm parameters as follows:

Q_1	1000
Q_2	0
UseTestOriginal	FALSE
UseTest1	TRUE
UseTest2	TRUE
UseTest3	TRUE
UseTest4	TRUE
UseTest5	TRUE
V_0	90
V_1	10
Plow	0.2
Phigh	2.0
P_1	0.1
P_2	0.1
P_3	0.1