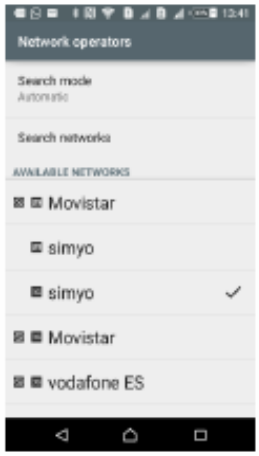
Ref: FAQ0400	Version: 1.0
Title – HWM Logger roaming SIM cards	
Made By: AB 12/04/17	(Issue 1)

How HWM Data logger roaming SIM cards work

Roaming SIM cards and network selection

With most SIM cards the device has full control over which network the device chooses to register to. This applies to P4, P6, EE, Vodafone UK, O2 UK and Vodafone GDSP SIM Cards.

A device modem can be set to auto or manual selection, this is the same as with your mobile phone when abroad. With either setting it is the device choosing the network and not the SIM card, the SIM card essentially only provides an identity so the network knows who to bill for the usage.



When set to auto mode; if the modem uses the 3GPP industry standard, below is a much simplified summary of the process and rules;

1. The modem searches for local cell site radio broadcasts and creates a "broadcast list", you can see this process on your mobile phone by selecting "choose networks manually" and "search for a network", this process will take around 1 to 2 minutes.
2. The modem checks the SIM card to see what the SIM card owner (EE, Vodafone etc.) has entered as the networks it prefers the device use in that country, this is called the PPLMN.
3. The device attempts to register to first network in that list on its broadcast list and goes down the list until it succeeds.
4. If the device cannot see any networks that are on the preferred list then it will choose the network that has the strongest signal. If the SIM has no list, then it will use the strongest signal straight off (DataSIM P4 and P6 have a blank preference list by default).
5. When the device is turned off and then turned back on it will first try and register to the network it was last registered to; this saves time in checking the broadcast list. If it cannot see that network it will then create a broadcast list and go back through the selection process above.
6. If a device is denied access to a network then it will add that network to the forbidden list on the SIM card and will not attempt to access that network again until the device is turned off and on again, this list is called the FPLMN.

The results in some important considerations for m2m devices using data;

- The device chooses the network based on the PPLMN or based on signal strength, not based on whether a network supports GPRS, so devices can camp on networks with no data usage. This can be avoided by adding a custom PLMN list, some devices can also be set to drop networks with no GPRS attached – whether or not this is supported by a device is down to the manufacturer.
- If a cell site supports GPRS the modem still cannot check that downstream IP access is working on that network. To handle this either the modem should support an ICMP timeout or an application layer above the modem will need to be implemented to handle the network selection process.

Document History:

Edition	Date of Issue	Modification	Notes
1st	28/01/15	Release	

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