


Water conversation

Largely invisible to the end user

One bill - once a year

 **Bill date**
21 July 2009

Water Services Bill
Tel: 0845 9200 887

1 Account Number
12345-67890

If you like the convenience of using online services,
you can pay your bill, tell us you're moving and
more, simply log on to www.thameswater.co.uk

12345 678 90
MR EXAMPLE
ADDRESS LINE 1
ADDRESS LINE 2
POST CODE

MR A EXAMPLE

2 Your water services bill for 1 April 2009 to 16 July 2009

Total payable
£82.19 **3 The total shown is now due**

See below

Service charges		1 April 2009 - 16 July 2009 (107 days)		This is your first bill for this property			
4	Water	36 m ³ @ 113.13p	5	Volume charge £	40.73		
	Wastewater	36 m ³ @ 55.76p		Fixed charge £	7.62		
					6	7	£48.35
							£33.84
				Charges		£82.19	

Meter Readings		Meter number	Charged size mm	Previous reading	New reading	Volume used m ³
17 July 2009		12A345678	12	469 Initial reading	505	36
8	9			10	10	10

36m² - is that good?

How is usage measured?



Mechanical meter on street

How does it work?

- Magnets turn mechanical counter
- Meter rotations can be also be detected by magnetic sensors

Communication

Bad


- Underground
- Outside of the property
- No wires allowed
- No line of sight



Good

- Plastic lid

Can beacons work here?



 iBeaconDetector
iBeacon:1 (Total:1)

 STOP 

BlueBar Beacon D0FF507C7AE7 00:07:80:7F
Last Updated:2015-01-23 20:52:34.3659
RSSI:-85

This is iBeacon!
UUID=A0B13730-3A9A-11E3-
AA6E-0800200C9A66 Major=32895
Minor=15865 TxPower=-82

0201061AFF4C000215A0B137303A9A11E3
AA6E0800200C9A66807F3DF9AE1C09426C
756542617220426561636F6E204430464635
30374337414537000000

Yes - good single within 5 meters of cover

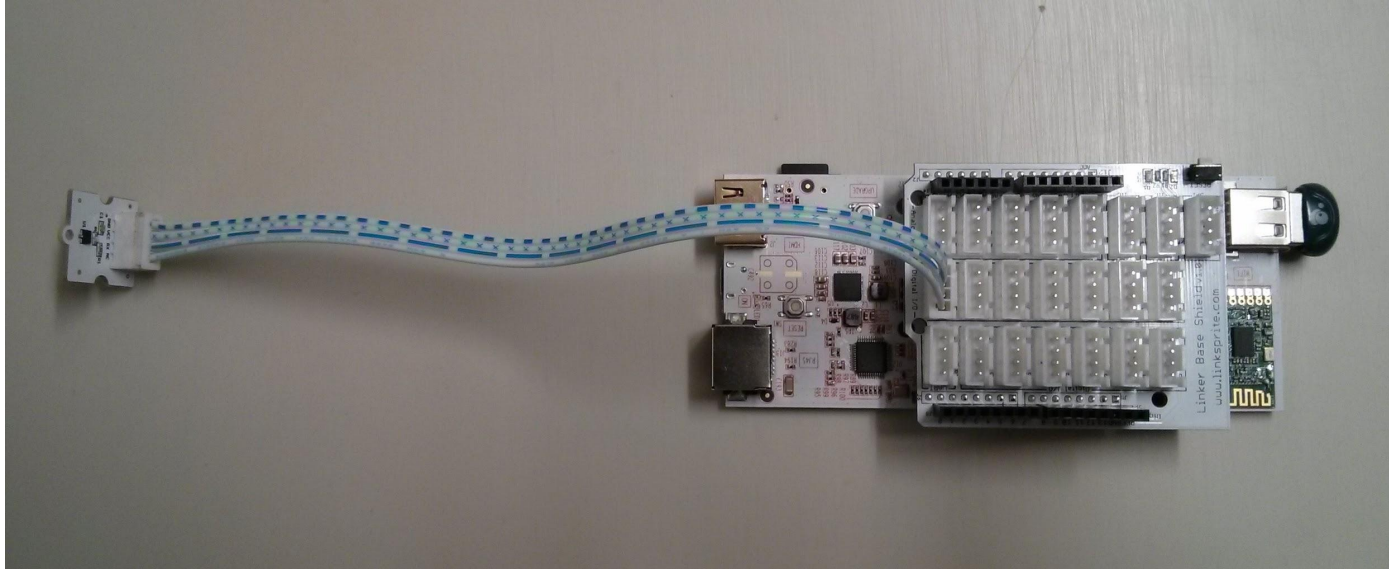
But - needs to be near surface for best range

Needed

Beacon with:


- magnet sensor
- radio

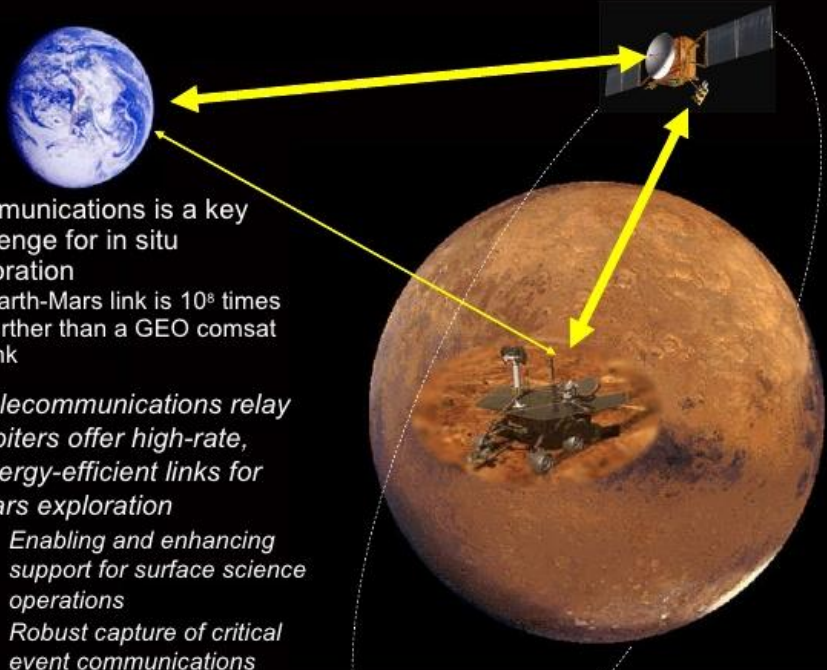
Beacon prototype



Hall effect sensor - Arduino - Bluetooth LE

No direct communication possible

 *Mars Telecommunications Overview*



The diagram illustrates the communication architecture for Mars exploration. It shows Earth on the left and Mars on the right. A yellow arrow points from Earth to a satellite in space, and another yellow arrow points from the satellite to Mars. A third yellow arrow points from Mars back to Earth. Dotted lines represent the orbits of the satellite and the Mars rover. The satellite is shown in a high-orbit position, and the Mars rover is shown on the surface of Mars.

- Communications is a key challenge for in situ exploration
 - Earth-Mars link is 10^8 times further than a GEO comsat link
- *Telecommunications relay orbiters offer high-rate, energy-efficient links for Mars exploration*
 1. *Enabling and enhancing support for surface science operations*
 2. *Robust capture of critical event communications*

Uplink to mobile phone

- User walks past the meter twice a day
 - 2 x 5 seconds per day
 - Beacons stores meter counts
-
- Beacons pings twice per second
 - Good chance of passing data to phone
 - Phone uploads to cloud

Usage

- User can see results of conversation measures
- Leak alert