

## APPENDIX 2

### ENERGY STORAGE IN BATTERIES

**Table A2.1 Energy Storage in AA Batteries (Battery Energy)**

Type of the Battery	Avg Voltage during discharge	milli-Amp hours (mAh)	Watt-hours Wh	Joules J
Alkaline	1.225	2122	2.60	9360
Carbon-zinc	1.1	591	0.65	2340
Nickel-Cadmium	1.2	1000	1.20	4320
NiMH	1.2	2100	2.52	9072
Lithium Ion	3.6	853	3.1	11050

#### **Energy Calculation for IRIS motes (IRIS Data Sheet information):**

IRIS motes are battery operated sensor nodes of supply voltage 3V. The computed battery life of a mote is 17.35 months. Therefore,

$$\begin{aligned} \text{Total Energy of a mote} &= 17.35 \times 30 \times 24 \times 3 \times 2100 \times 10^{-3} \\ &= 78699.6\text{J} \end{aligned}$$

Energy Calculation for IRIS motes working on AA Battery is in thesis considered to be of full energy if 78699.6J which is appropriate to become the CH.

Less than 20% ie 15739.92J as lower energy node converted & capable to act as end device with only a short range of transmission to CH.