Live E! workshop in the 11th APNG Camp

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in Kuala Lumpur, Malaysia

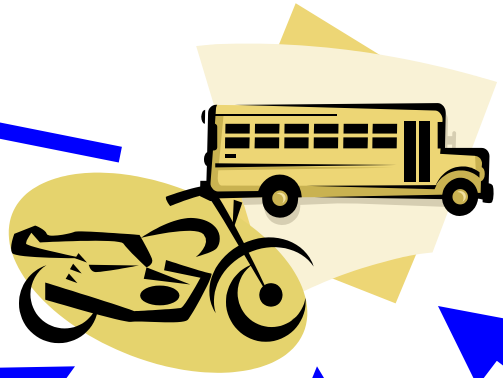
Schedule in the Live E! workshop

- Introduction
- Group Activity Ⅰ (Configuration)
- Group Activity Ⅱ (Experiment A)
- Coffee Break
- Group Activity Ⅲ (Experiment B)
- Wrap up

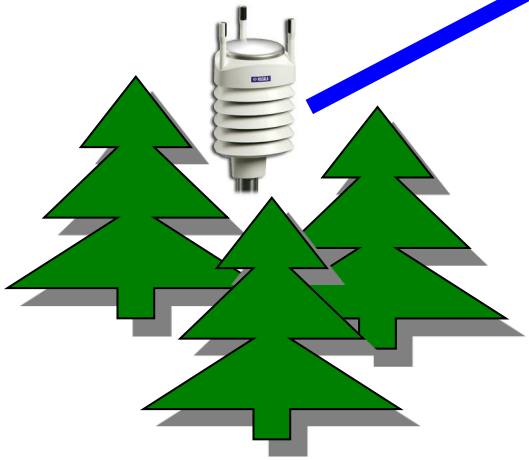
Data Collection from Isolated Areas

Collect sensor data from isolated areas by transportation (e.g., cars).

Live E! Application

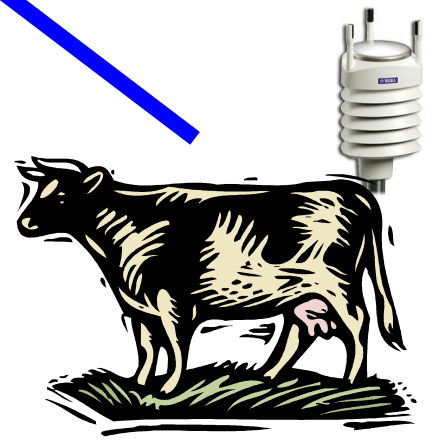


Transportation



Mountains

Agricultural field



Agricultural field

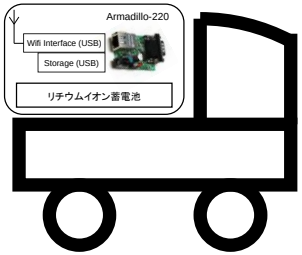
Mechanism

Cars collect data from sensors and deliver to the Internet GW.

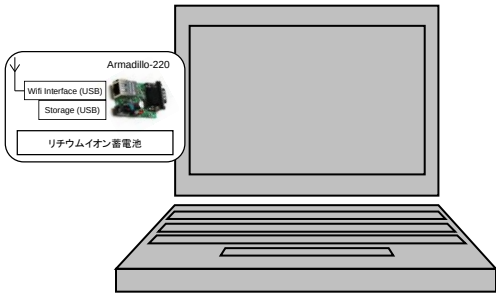
1. General purpose message delivery framework (not only for data collection).
2. Message delivery framework that are tolerant against natural disasters.

Sensor

No Internet Connectivity



Mobile Node



Internet Gateway

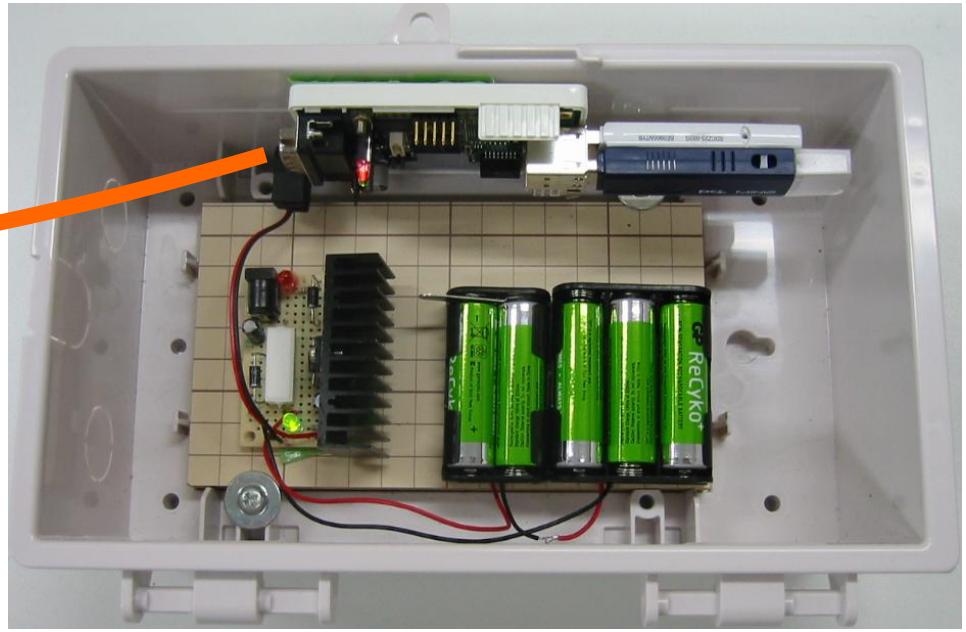
Delay (or Disruption) Tolerant Networking (DTN)

Weather Station

Weather Sensor (WXT510)

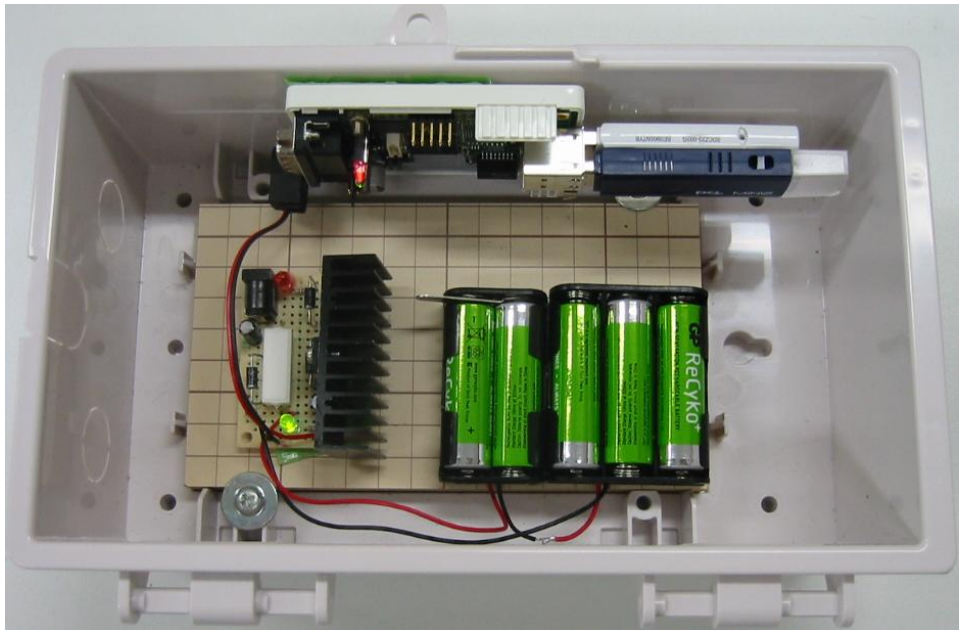
- Temperature
- Humidity
- Pressure
- Rain Fall
- Wind Direction
- Wind Speed

RS232C(Serial)

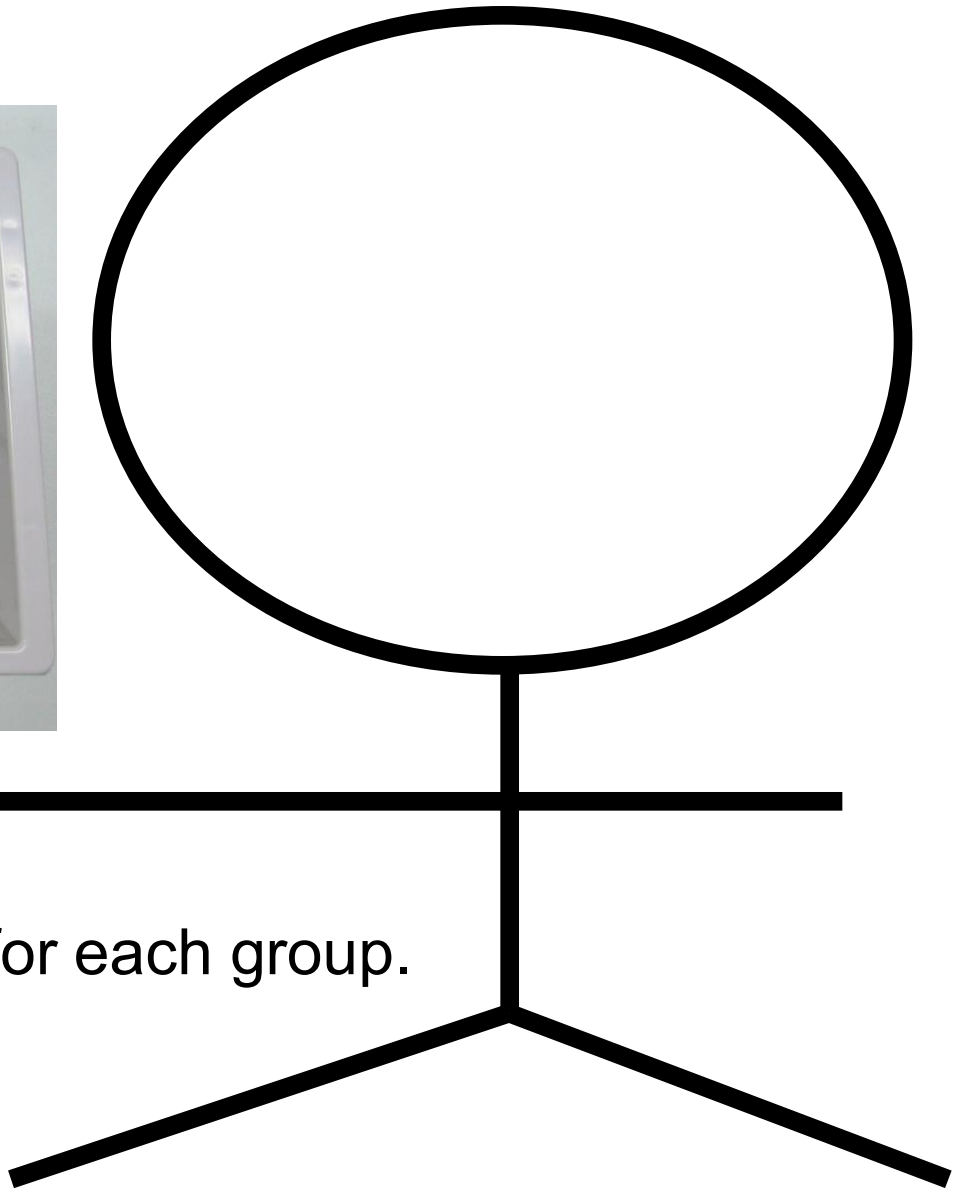


DTN node

Mobile Node -- Carry by hand!!



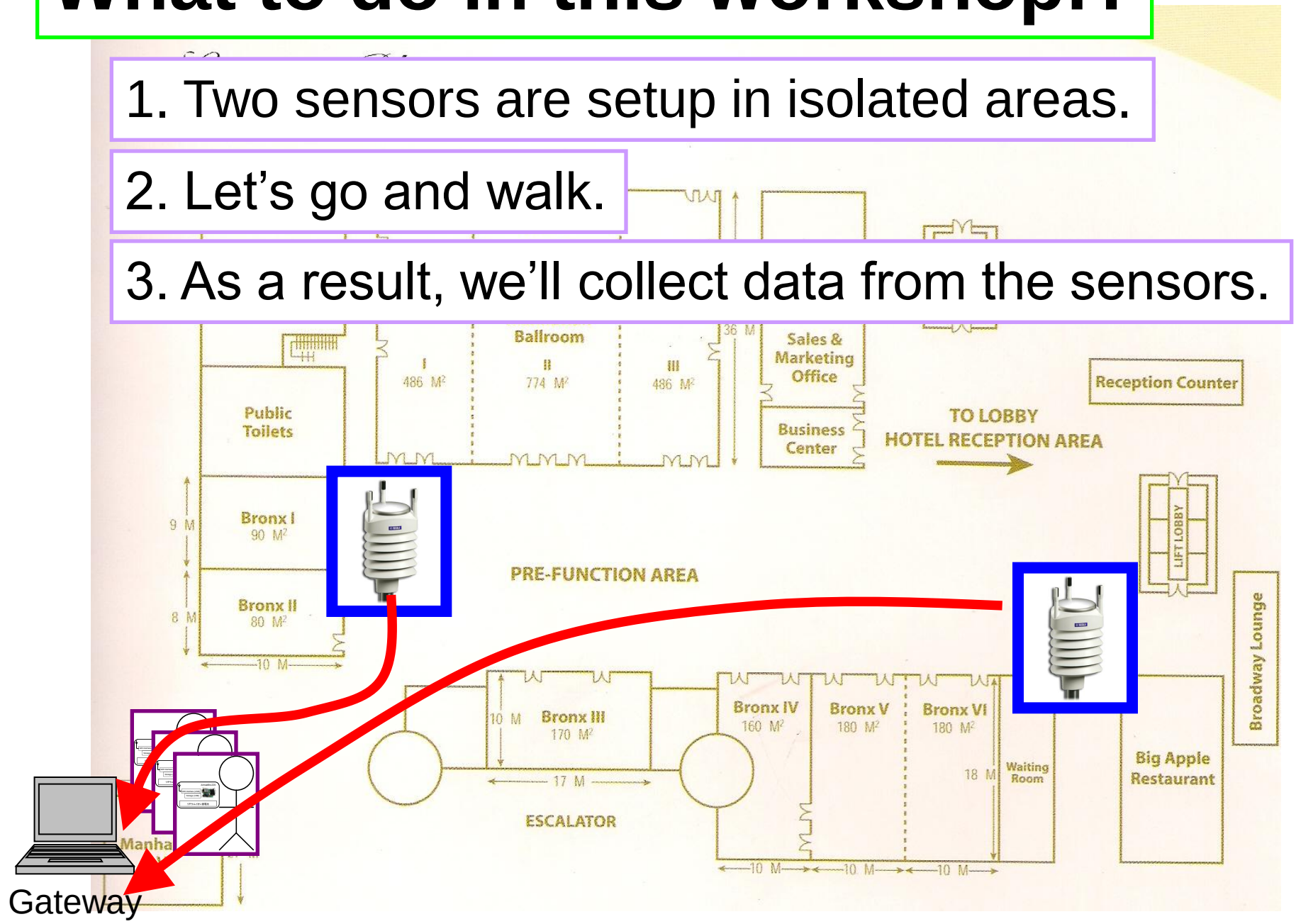
DTN node



We'll provide one DTN node for each group.

What to do in this workshop!?

1. Two sensors are setup in isolated areas.
2. Let's go and walk.
3. As a result, we'll collect data from the sensors.



DTN Nodes for the Experiment

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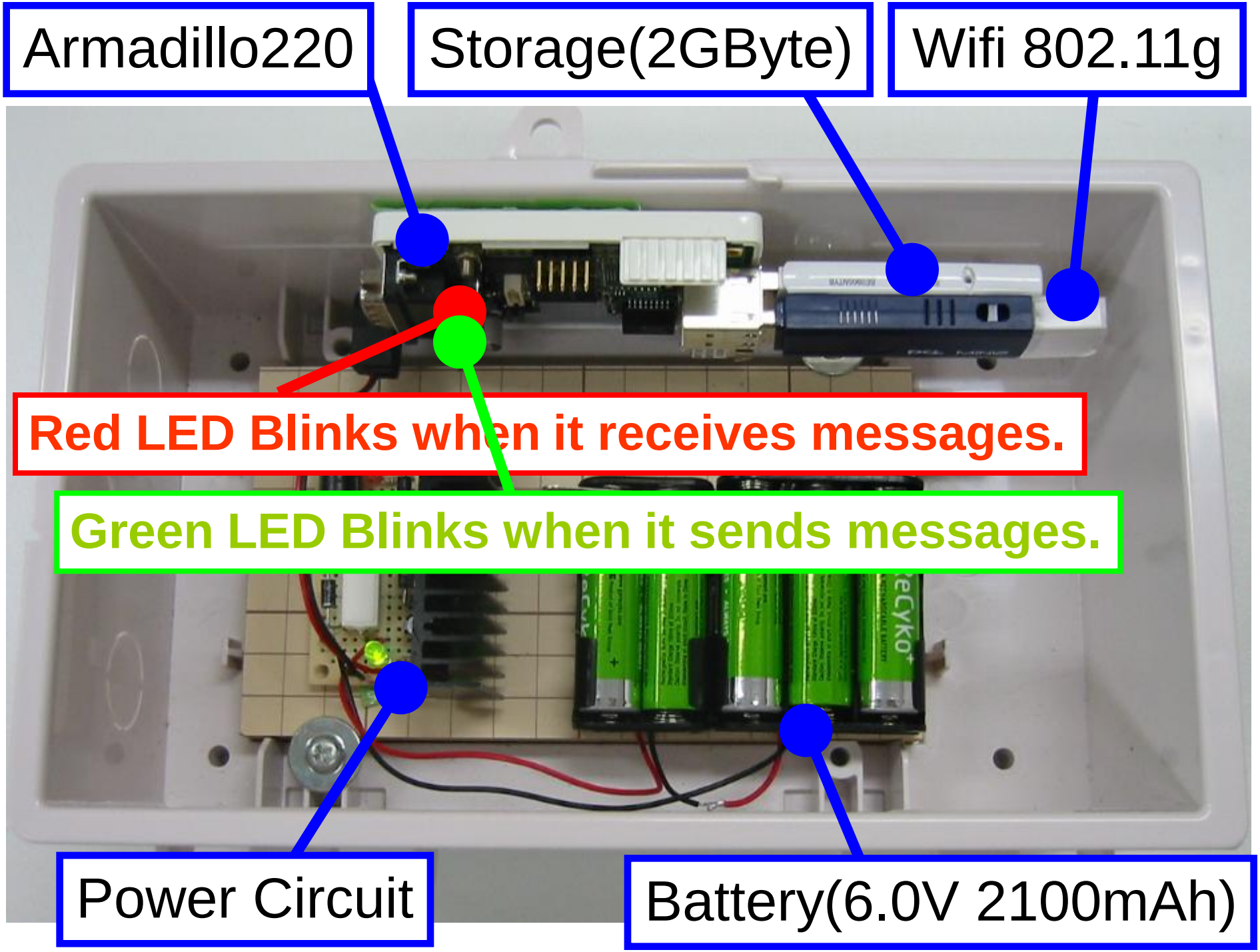
- Coffee Break
- Group Activity Ⅲ (Experiment B)
- Discussion
- Conclusion

<< Group Activity Ⅰ >>

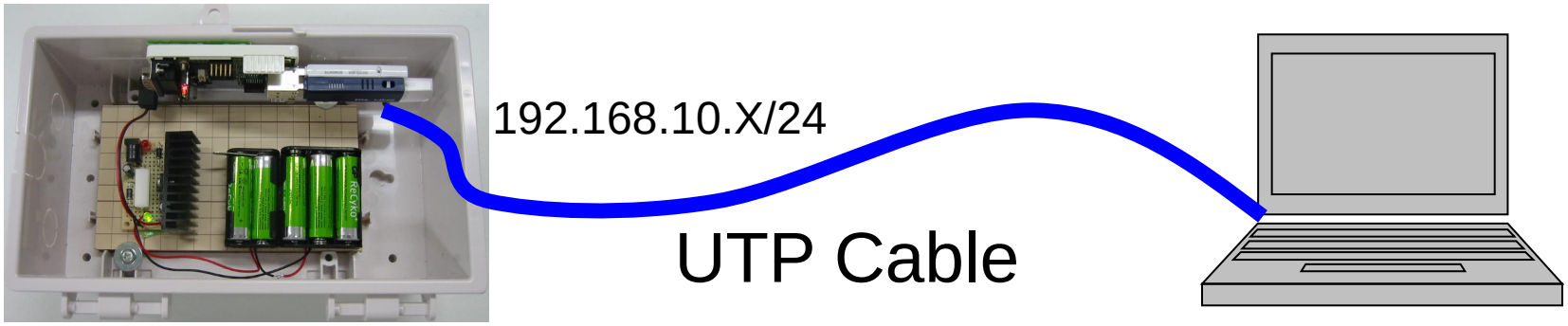
Configuration

1. Login to the node.
2. Set wireless interface and IP address.
3. Test by ping.
4. Synchronize the clock.
5. Log directory setting.
6. Execute a messaging daemon.


Armadillo220
Storage(2GByte)
Wifi 802.11g
Red LED Blinks when it receives messages.
Green LED Blinks when it sends messages.
Power Circuit
Battery(6.0V 2100mAh)

<< Configuration >>

[1/6] Login to your node



* X is the number of the node: 3, 4, 5, ..., 10

```
$ ssh live-e@192.168.10.X
Password: 00000000
[live-e@WSnode (ttyp0) ~] $ su -
Password: root
[root@WSNode (ttyp0) ~] #
```

<< Configuration >>
[2/6] Set wireless interface and IP address

```
# ifconfig rausb0 up
# iwconfig rausb0 essid DTN mode ad-hoc
# ifconfig rausb0 192.168.25.X
```

* X is the number of the node: 3, 4, 5, ..., 10

<< Configuration >>

[3/6] Test by ping

```
# ping 192.168.25.1
# ping 192.168.25.2
# ping 192.168.25.3
# ping 192.168.25.4
# ping 192.168.25.5
# ping 192.168.25.6
# ping 192.168.25.7
# ping 192.168.25.8
# ping 192.168.25.9
# ping 192.168.25.10
# ping 192.168.25.99
```

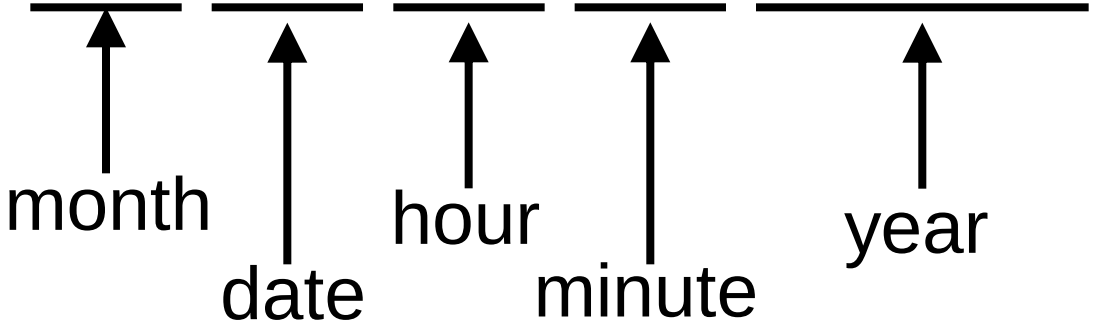
<< Configuration >>
[4/6] Synchronize the clock of the DTN node

- Synchronize the clock to

  the clock presented at the display

== date command format ==

```
# date 0722094002009
```



<< Configuration >>

[5/6] Log directory setting

```
# cd /home/www-data/storage/
# mkdir 0722
# cd 0722
# pwd
/home/www-data/storage/0722
```

<< Configuration >>

[6/6] Execute a messaging daemon

peard X 192.168.25.255 &

* X is the number of the node: 3, 4, 5, ..., 10

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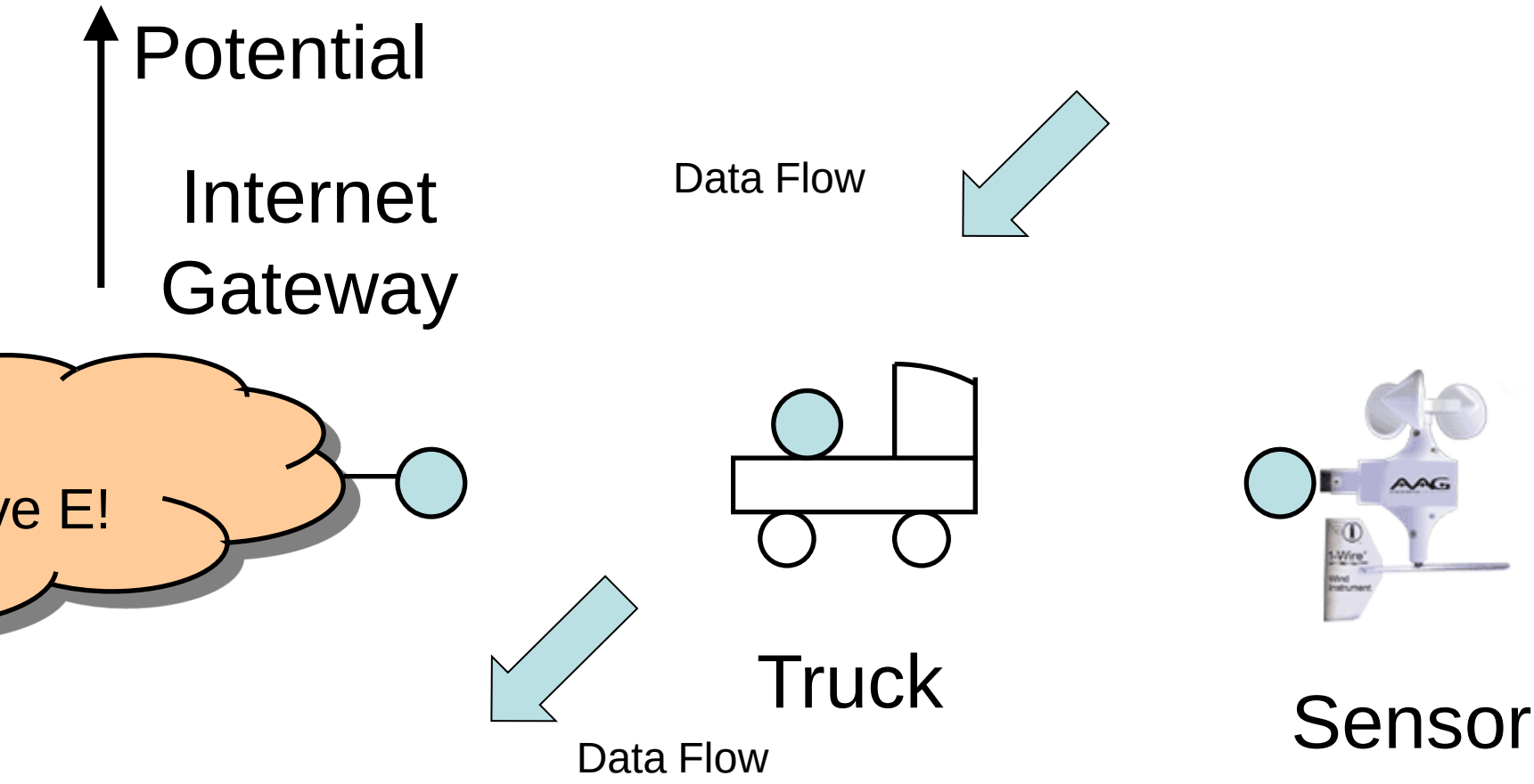
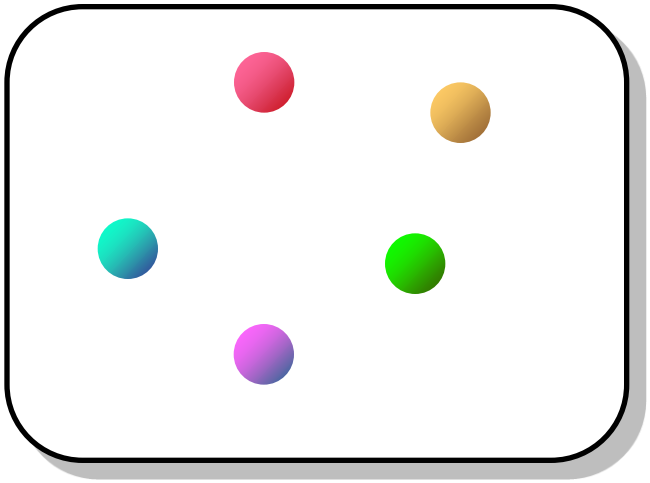
Potential-Based Routing



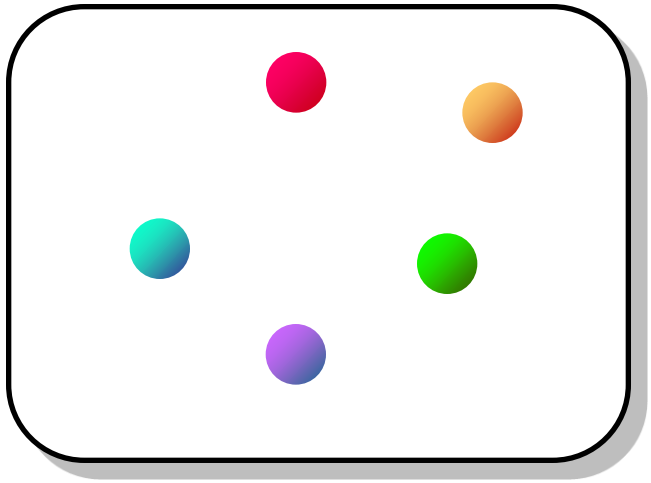
To deliver sensor readings to the Internet GW

: Wireless Device

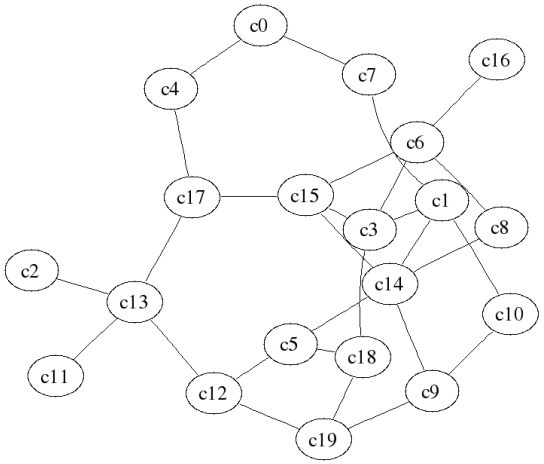
Mobility Entropy and Message Routing



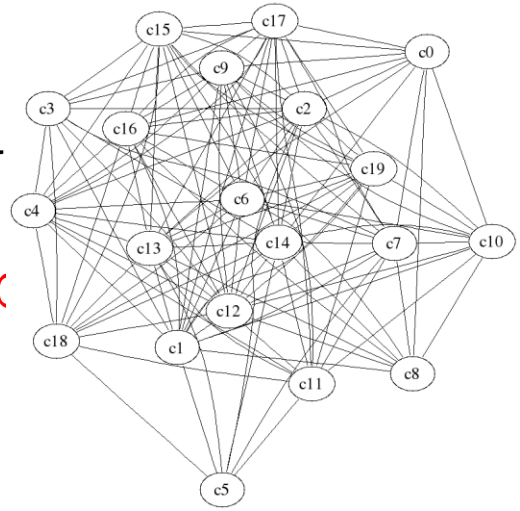
Small Entropy



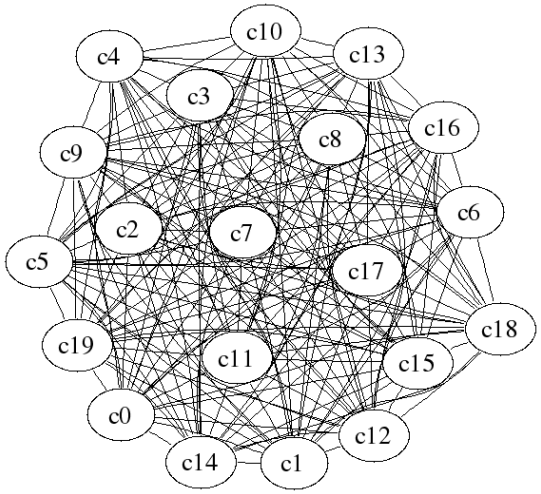
Large Entropy



Mobility Entropy = 1



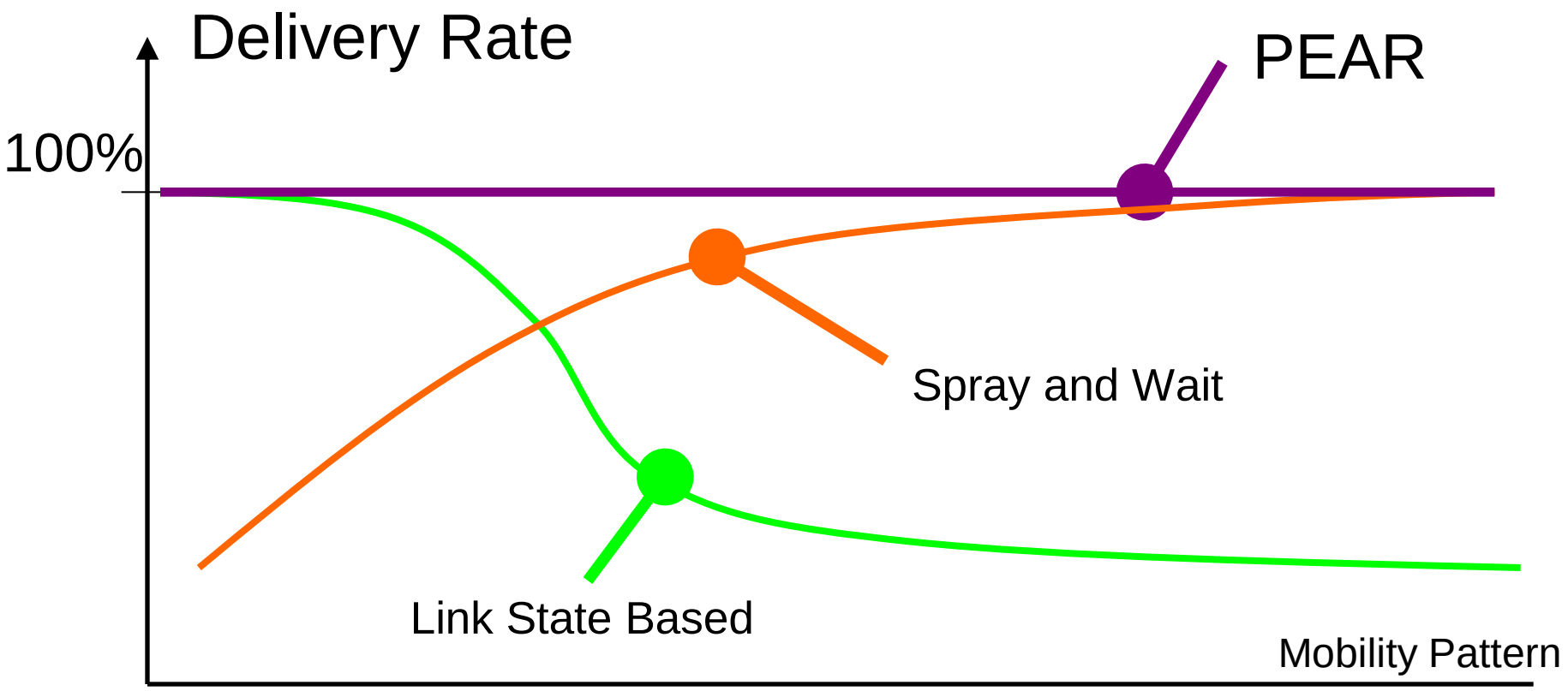
Mobility Entropy = 2

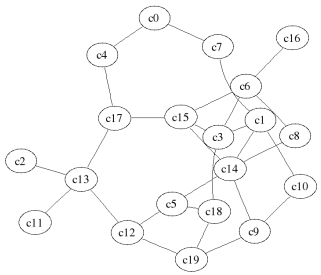


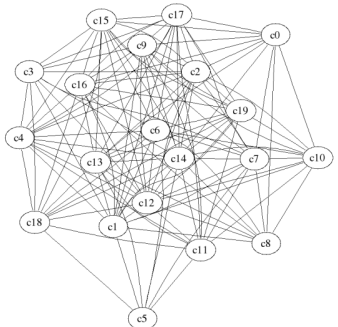
Mobility Entropy = 3

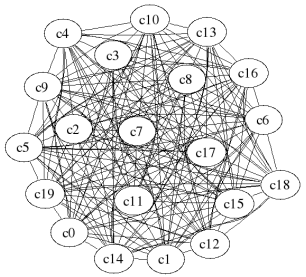
Contact Graph

Potential-Based Entropy Adaptive Routing (PEAR)



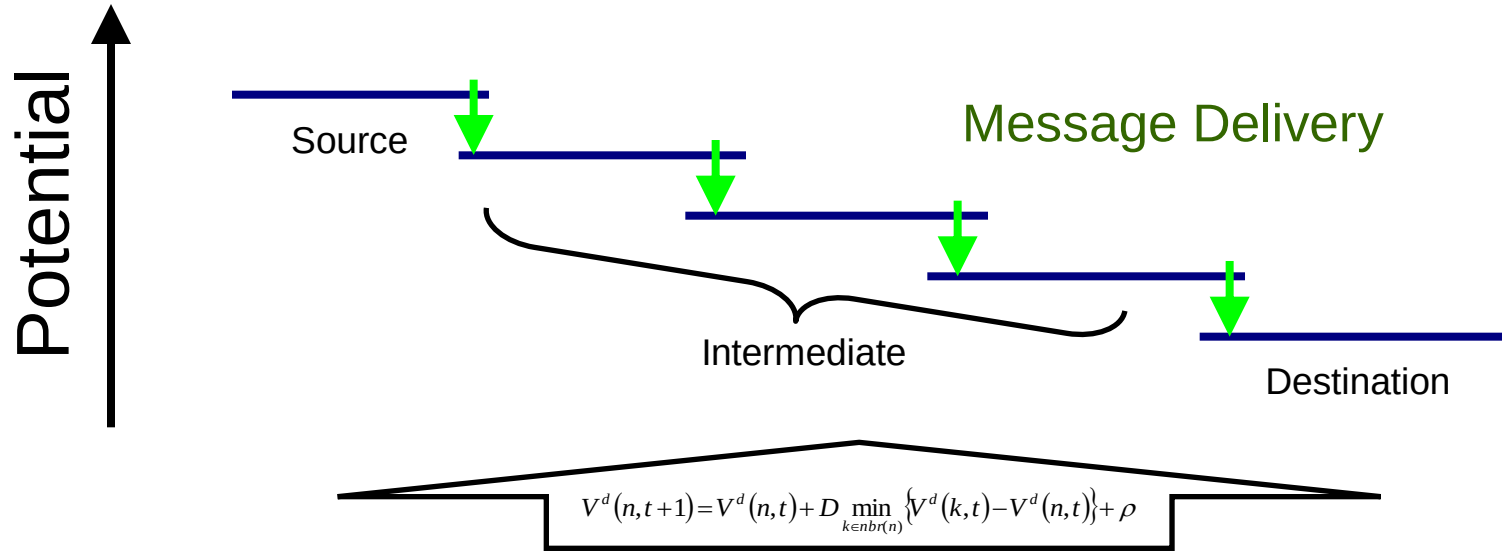


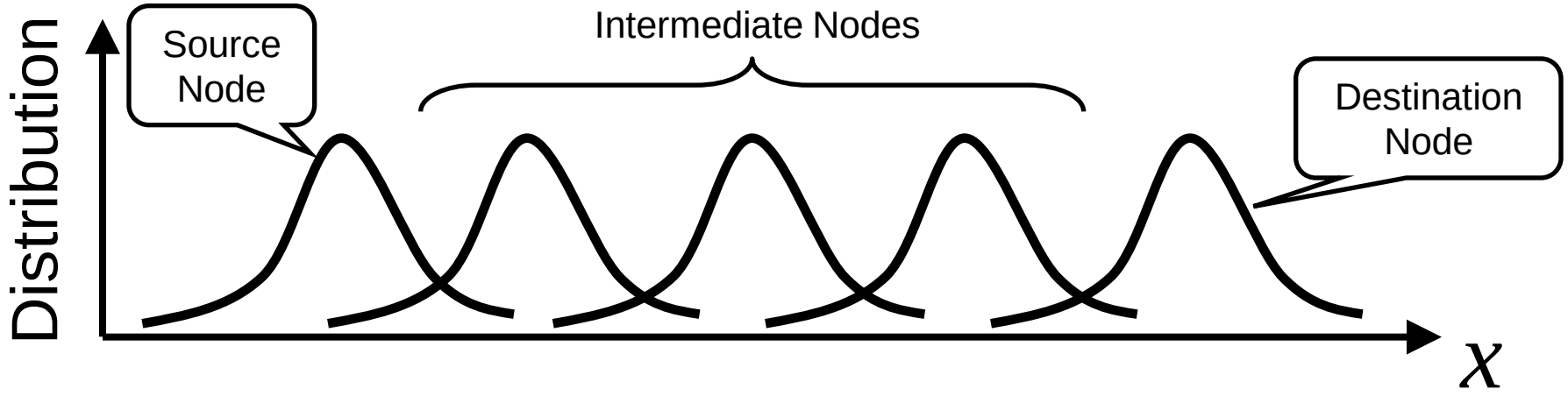




Potential and Message Routing

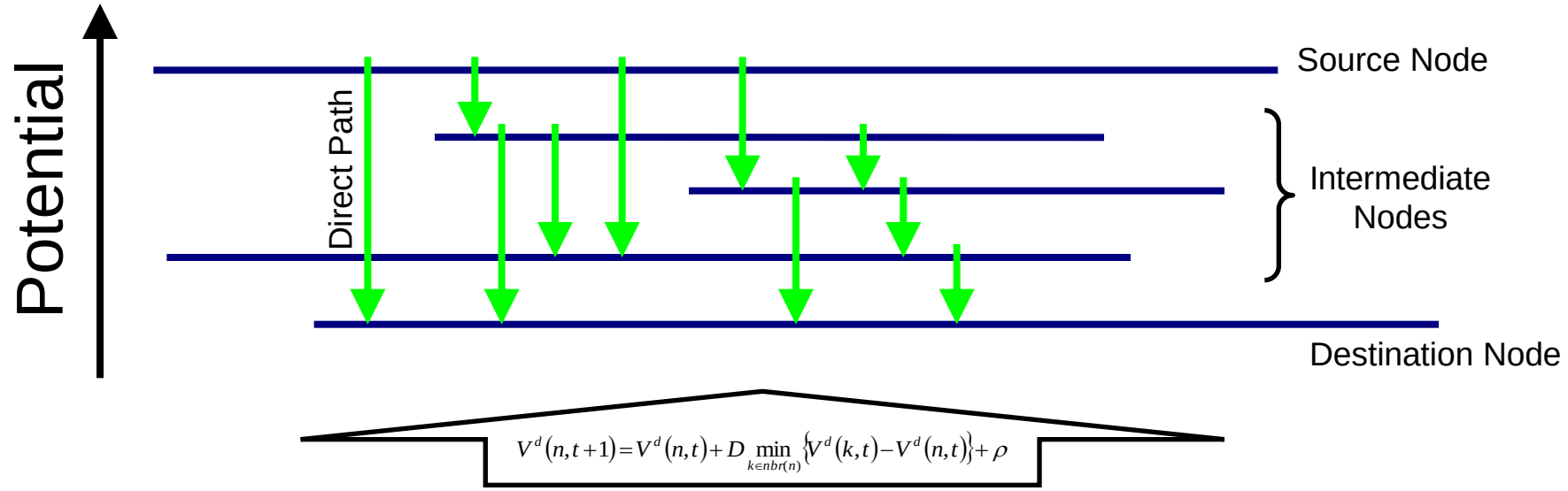
Small Entropy Case

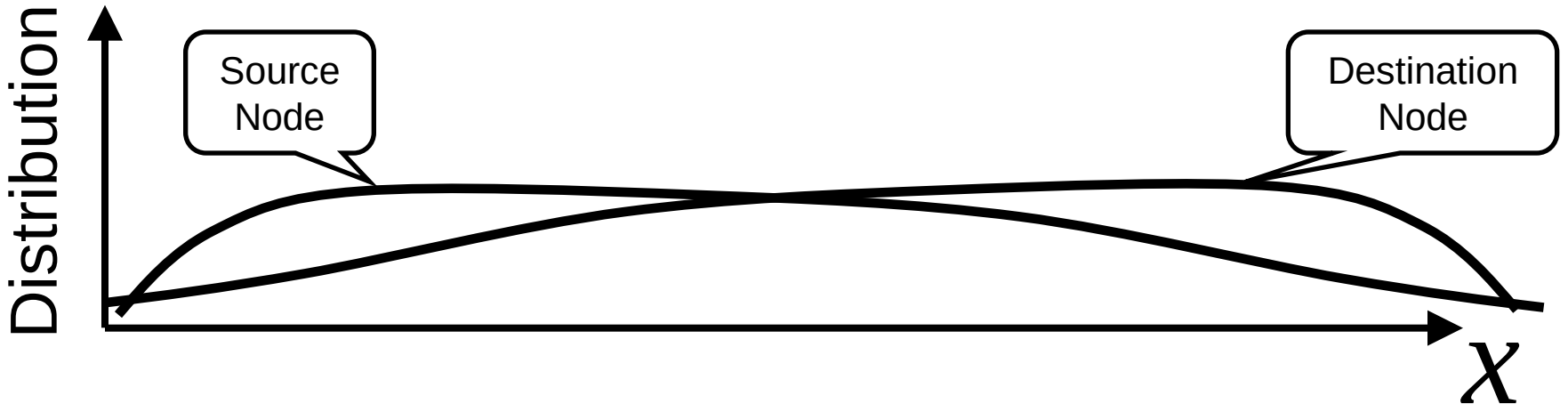




Potential and Message Routing

Large Entropy Case





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