

# Loop Detection & Backtracking Proposal

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# Example: Network with loop

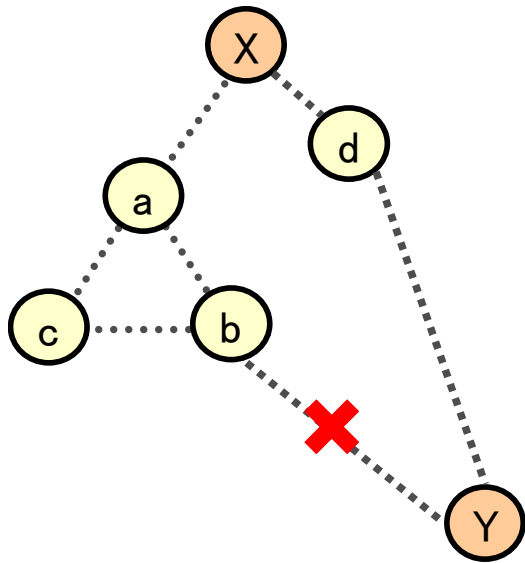


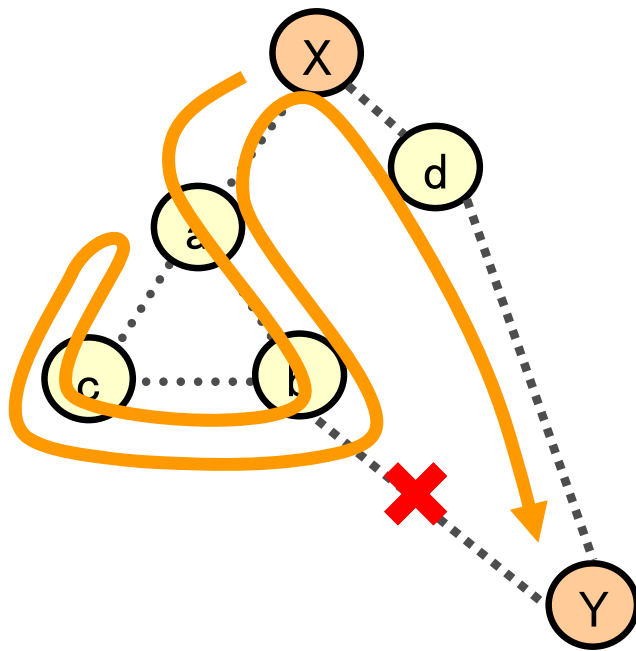
Figure 1: A simple network model.

Table 1: Some options to describe how limited DADR works on against loop.

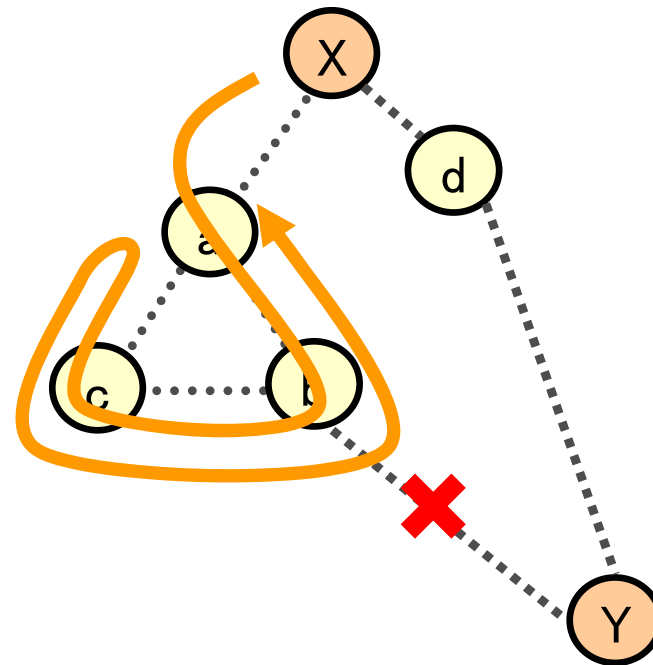
	Backtrack	
	With	Without
Loop detection by using FID (Frame ID)	Option1	Option 2

Figure 1 shows a simple network model and tries to explain loop detection. Note that node X tries to send data to node Y. Suppose that link error happens between node b and node Y after routes were established. We show loop detection and handling by using some options described in table 1.

# Example: possibility of loop detection with or without backtracking



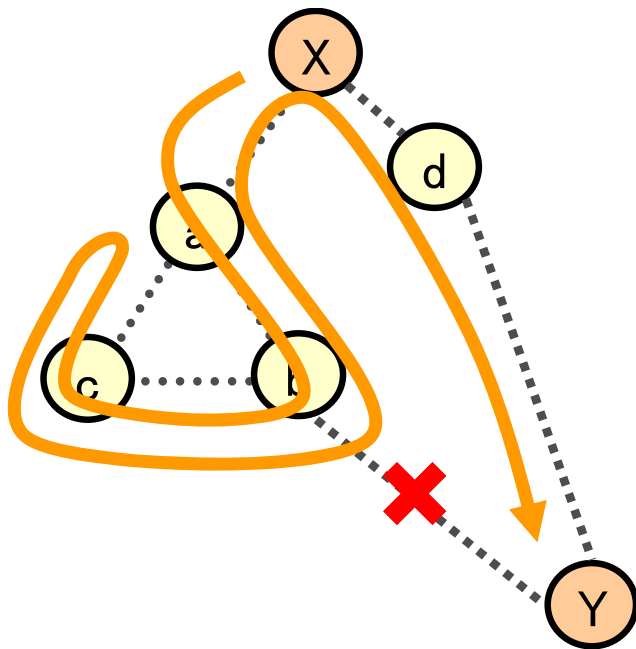
**Figure 2: Data forwarding with backtracking (option 1).**



**Figure 3: Data forwarding without backtracking (option 2).**

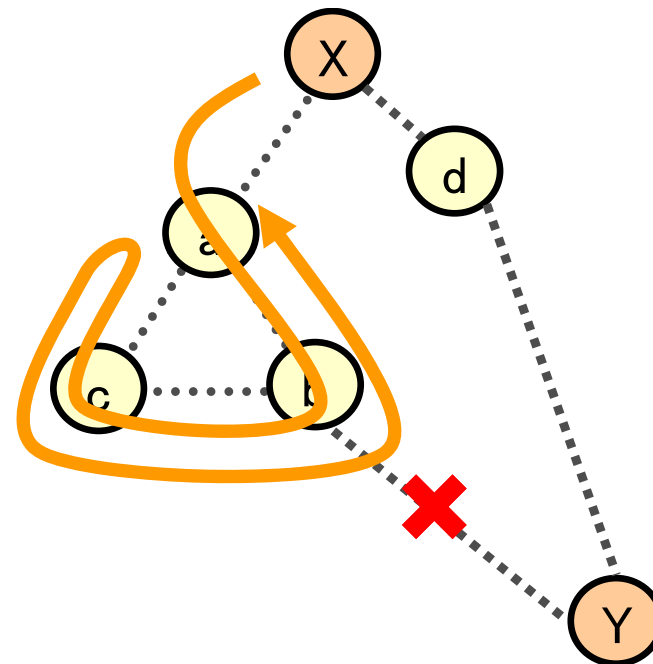
# Loop Detection

With back track



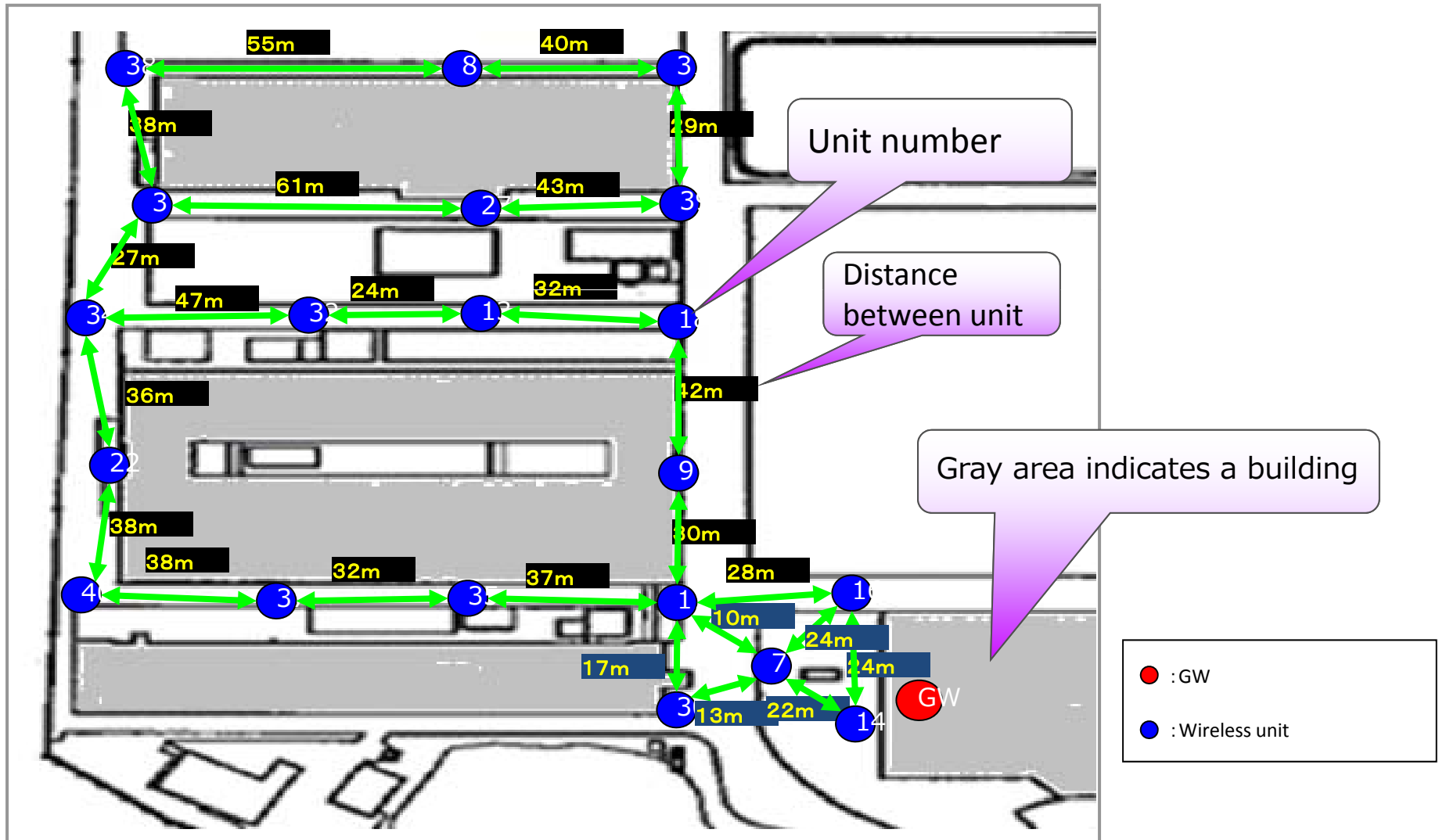
Routing table (Node a)			
Global	Dst	Local Dest	Weight
Y		b	1
		c	2

Without back track



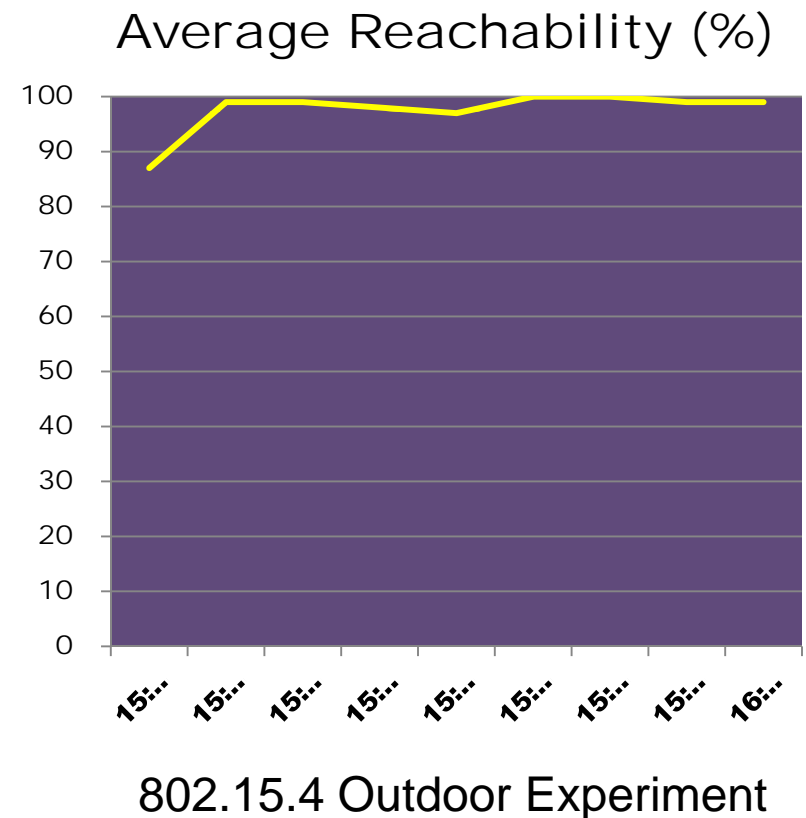
Loop detection table (Node a)				
Global Src	Global Dst	Local Src	Local Dest	FID
X	Y	X	b	1

# GW/Unit layout (802.15.4 Outdoor Experiment)



# Preliminary Result - Average Reachability

- 802.11b test result showed 100% data reachability as long as there is a connectivity to other node
  - 1500 nodes
  - 300m x 300m to 1km x 2km
- 802.15.4 is **preliminary** result
  - Experiment condition glitches made less than 100% reachability
  - Plan to redo the experiment again soon and expect that the reachability will improve



# Proposal

- Consider loop detection and backtracking during data forwarding for RPL
  - Tested out to show high data reachability
- Consider relaxing loop avoidance
- Pros
  - Simpler DAG creation and maintenance
- Cons
  - Additional node requirement for loop detection and backtracking, but
    - For a 256-node network, additional memory required would be 2.3 Kbytes for 802.15.4 network where each node is transmitting 40 K bits per second with ACK waiting time is set to 100 msec