

Using DataAnlApp application (on windows)

Note:

If DataAnIApp runs on another computer different than the computer on which run the ExpCtrApp, then do this extra-step:

- 1. Import **backup**¹ database
 - a. Put backup.sql into: MySQL Server 5.0\bin\ folder
 - b. Open the MySQL shell window and run:

\$create database any informative name

c. Run

\$use any informative name

d. Run

\$source backup.sql

DataAnlApp application provides **four different interfaces** that will be explored in the rest of this tutorial.

1. Logging using the **Logging interfcae**: Using this interface, the user can connect to an existent MySQL database:

¹ Buckup database is filled by ExpCtrApp. If you did not perform experiments yet, Buckup database would be empty.

🛃 StartInterfa	e			
Logging interface				
- Logging info	ormation			
Address	localhost			
User :	root Password :	aaaa Database :	outdoor	
	C	onnect		
RadiaLE: a framework for benchmarking link quality estimators				

2. In the Experiment details interface, select the experiment ID and the run number

FirstInterface				
Experiments details				
Real-Experiment —				
Experiment ID :	PT20090814_04	Run Number : 1	~	

3. Information related to the select experiment and the run are then displayed.

Real-Experiment			
Experiment ID : P	T20090814_04	Run Number :	1 💌
Experiment Informativ	ons		– Tasks
Number of nodes :	49		
Environment :	Outdoor		Define nodes position
Traffic :	Burst		
Total sent packets	: 1000		
Burst window :	100		Links characterization
Interpacket interva	l: 128		
Retransmission :	true		
Payload size :	28		Links Quality Estimation
Tx power :	3		
Channel :	26		Exit
Topology :	Circular		

- 4. The user is asked to define nodes positions vector. These positions are defined relatively to the central mote N1
- 5. Chose either **experiment link characteristics** to analyze the channel behavior, or **link quality estimation** to evaluate the performance of Link Quality Estimators.

6. You can start by selecting **experiment link characteristics**. The Link Characterization interface will appear:

A SecondInterface						
Link characterization						
Distance line curves						
Select the average window size (w): "Each metric will be computed over each (w) packets" 	Node Id 2 vindow 5					
Window size 200 compute LQC						
PRR = f(distance)	Packet reception Humidity Noise					
scatter errorbar Graph	Retries temperature Light					
LQI = f(distance)	🗌 Rssi 🔄 Lqi 🔤 Snr					
scatter errorbar Graph						
RSSI = f(distance)	Graphs					
scatter errorbar Graph						
SNR = f(distance)	Asymetry level (CDFunction)					
scatter errorbar Graph						
PRR = f(rssi) PRR = f(snr) PRR = f(lqi)	Window size 100 Asymetry levels					
Graph Graph Graph						
RadiaLE: a framework for benchmarking link quality estimators						

With this interface, the user can study spatial and temporal characteristics of the underlying links.

A set of interesting graphs can be generated:

- PRR-RSSI-LQI-SNR=f(distance) (scatter or error-bar style)
- PRR=f(RSSI-LQI-SNR) (scatter style)
- PRR-RSSI-LQI-SNR=f(t) (per node)
- Humidity-Temperature-Noise-Light=f(t) (per node)
- Percentage of links asymmetry degree (CDF plot)
- 7. Turn back to the experiment details interface and select **link quality estimation** The **interface Link Quality Estimation** appears:

ThirdInterface					
Link quality Estimation					
Link Quality Estimation LQE-Metrics Assessment			Topology		
Beta SNR_th1 SPRR_th1 ASL_th1 0.6 2 0.25 0.01 SF_th2 SNR_th2 SPRR_th2 ASL_th2 0.5 7 0.95 0.3	Alpha SPRR 0.6 Alpha FLQE 0.9	Empirical CDFs Stability	Circular Other Nb of circles 8 Nb nodes per Circle 6 Update circle lines		
WMEWMA SRNP 4Bit Alpha Alpha Alpha 0.6 0.9 0.9	— RNP_ETX_PRR Do not have a particular parameter	Nodes list	Circle lines		
Common parameter Window 5 Compute LQE		5 6 7 Temporal behaviour	Grouped Seperated		
RadiaLE: a framework for benchmarking link quality estimators					

This interface implements 5 well known estimators and a recently proposed one.

These estimators are:

- o PRR: Packet Reception Ratio
- WMEWMA: Window Mean Exponential Weighted Moving Average
- o RNP: Retransmission Packet Number
- o ETX: Expected retransmission count
- o 4Bit: CTP Tree routing protocol estimator: tinyos2.x/tos/lib/net/4bitle

Using this interface, the user can tune each link quality estimator. A common parameter for all link quality estimators is the sliding window size. NB. More the window size will be small more the computation time will be huge.

Generated Graphs are

- o Coefficient of variation of each estimator.
- o The empirical cumulative distribution function of each estimator
- o The temporal behavior of each estimator
- $_{\odot}$ $\,$ The distribution of each estimator formulated into a scatter plot