Innovation-12

1. **Brief Name of the Innovation:**

   An Analytical tool for energy assessment in protocol and signalling for 3GPP-LTE

2. **Contact Information:**

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3. **What is the technology?**

   Energy efficiency has become one of the key factors in the design of next generation wireless system. A lot of computation and network activity is done by protocols in mobile systems. Increase in the performance and capacity leads to an increase in complexity and overhead in protocols and signaling procedures. With the rapid growth in the information and communication technologies (ICT) and ICT related technologies there is a need to make energy efficient design in all aspects including the protocol and control signalling for better system design. Little has been done for power consumption for protocol processing and signalling in mobile cellular systems.

4. **What does the technology do?**

   This tool is to analyze the power consumption during L2 and L3 protocol processing by user packets as well as control packets during the signalling procedure. Analysis is based on energy modeling of signalling events considering various parameters.

   i) Probability of UE going for Attach
   ii) cell size
   iii) UE density
   iv) Inactivity timer
   v) call duration time
   vi) residence time
   vii) probability of user going for TAU

5. **Explain the specific problem this technology has created to address or solve**

   There is a lack of tool which can specifically analyze the impact due to protocol processing. This also gives the impact on UE in terms of energy consumption due to signalling events.

6. **Why is it better? How much better?**

   There are no tools available which analyzes the energy impact on UE and eNodeB due to signalling activities.

   This tool has a unified model which takes many parameters as input as follows

   i) Probability of UE going for Attach

   ii) cell size

   iii) UE density

   iv) Inactivity timer

   v) call duration time

   vi) residence time

   vii) probability of user going for TAU

   viii) Processor MIPS/mW

   In the output section it will give the % of saving obtained with user defined configured parameters to the reference parameter.

7. **Have you filed for Intellectual Property (IP)? Have Patent Cooperation Treaty (PCT) applications filed?**

   Not yet started

8. **What is the development stage of this innovation?**

   The tool is under development in terms of adding more parameters in the model which is used to analyze the impact of network activity.

9. **Have any prospective users or buyers shown interest in this technology?**

   --Not yet approached--

10. Who do you consider competitors or competing technology?

Nokia has developed a tool "Nokia energy Profiler" which works only on symbian OS. Microsoft has a tool which is used to measure application power consumption in laptops.

11. List the milestones remaining to be accomplished to bring your technology to full development and ready for the intended end-user?

Making the tool into a software package for ready-to-use for Windows and Linux platform.

12. Broad Technical Specifications:

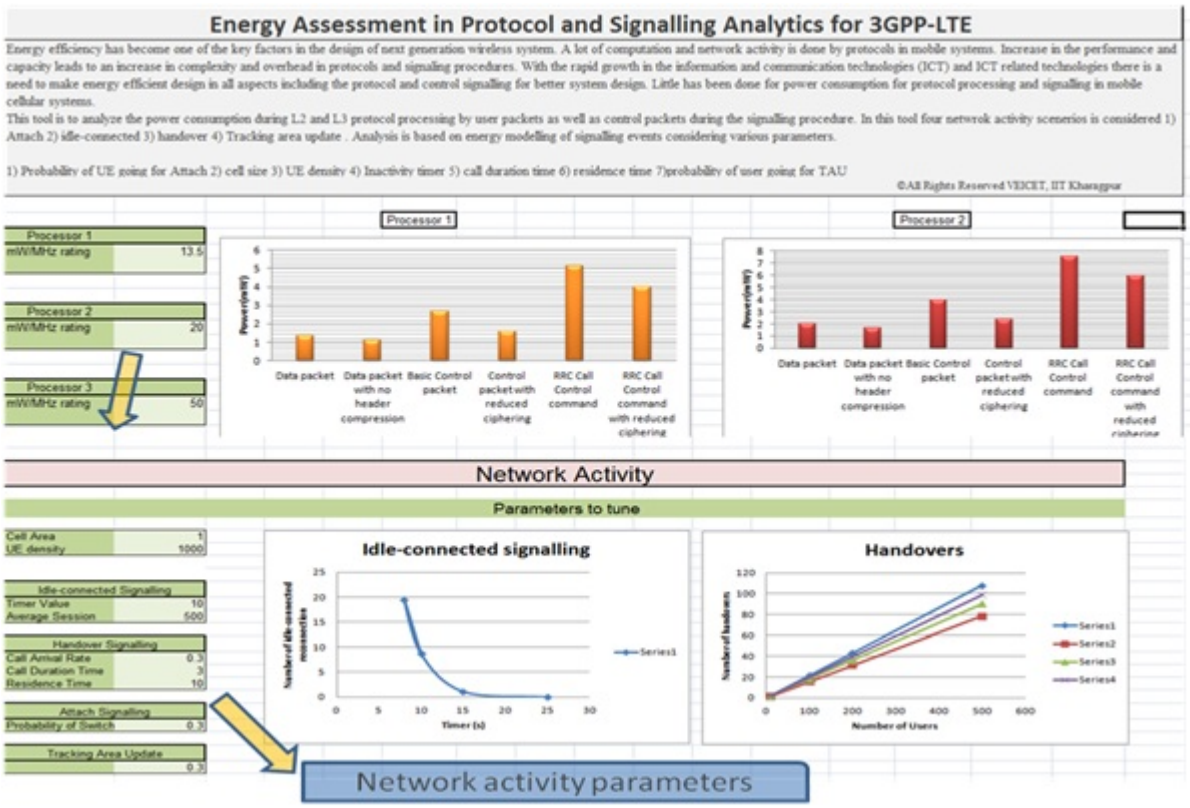
It is based on Microsoft Excel.

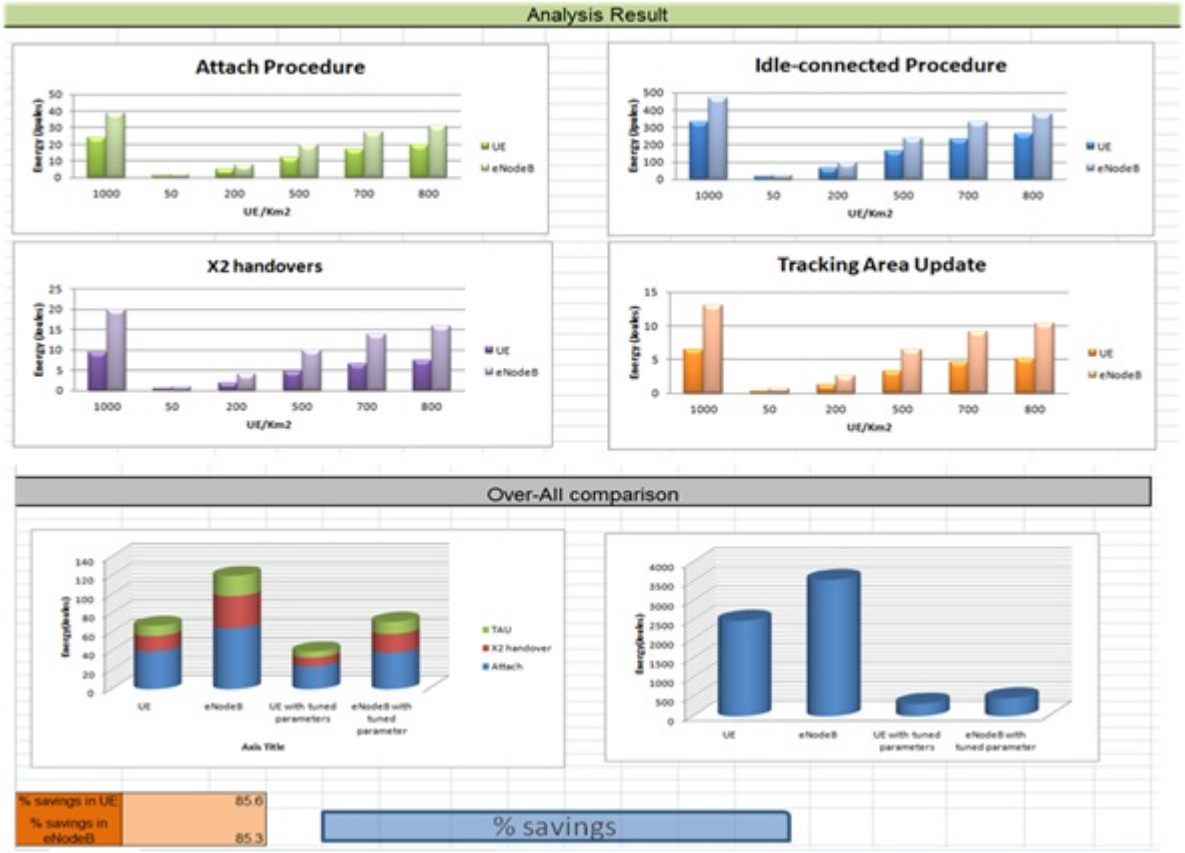
Easy to Use

Graphical Outputs

Signaling specification used in this tool is based on release 8 of 3GPP-LTE

13. Diagram or Pictures if any




Analysis Result
Attach Procedure
Energy (Ipeaks)
UE/Km2
1000
50
200
500
700
800
UE
eNodeB
Idle-connected Procedure
X2 handovers
Tracking Area Update
Over-All comparison
TAU
X2 handover
Attach
UE
eNodeB
UE with tuned parameters
eNodeB with tuned parameter
Axis Title
% savings in UE
85.6
% savings in eNodeB
85.3
% savings