

Configuration Guide: Strategic OLSR (SOLSR)

Description

Strategic OLSR (SOLSR) [1] consists of a variant of the standard routing protocol OLSR (Optimized Link State Routing, RFC 3626) [2], which is one of the most widely used protocols in ad hoc wireless networks. In this sort of networks, nodes are generally powered by means of batteries, which involves significant limitations regarding the time of operation of devices. In that sense, this work has been carried out in order to optimize the energy expenditure on nodes, especially on those devices characterized by a higher connectivity level (i.e. higher number of neighbors).

The SOLSR mechanism has been implemented through a set of modifications performed on the routing daemon olsrd (olsrd-0.9.0.2), which is a development carried out by the OLSR.org project [3]. In particular, our proposal introduces an evaluation of the energy consumption on the nodes, as well as a metric called strategic value (SV) which reports the importance of a node in the network in terms of connectivity. These metrics have been included inside the header of the hello routing messages. Therefore, the modifications carried out enable nodes to exchange information about the connectivity level and the energy consumption for the routing computation process. Specifically, in addition to the analysis of the number of hops, SOLSR considers, for the next hop selection, those candidate nodes with less energy consumption as well as less connectivity level (i.e. less strategic value). In this way, SOLSR aims to set up routes characterized by a suitable energy capacity and less contention level for the access to the wireless medium. Therefore, this modification allows to reduce both the traffic load and also the energy expenditure on those nodes with higher number of neighbors which are strategic to preserve network connectivity. Figure 1 shows a diagram that describes the modification carried out. Additionally, details of the SOLSR configuration are listed below.

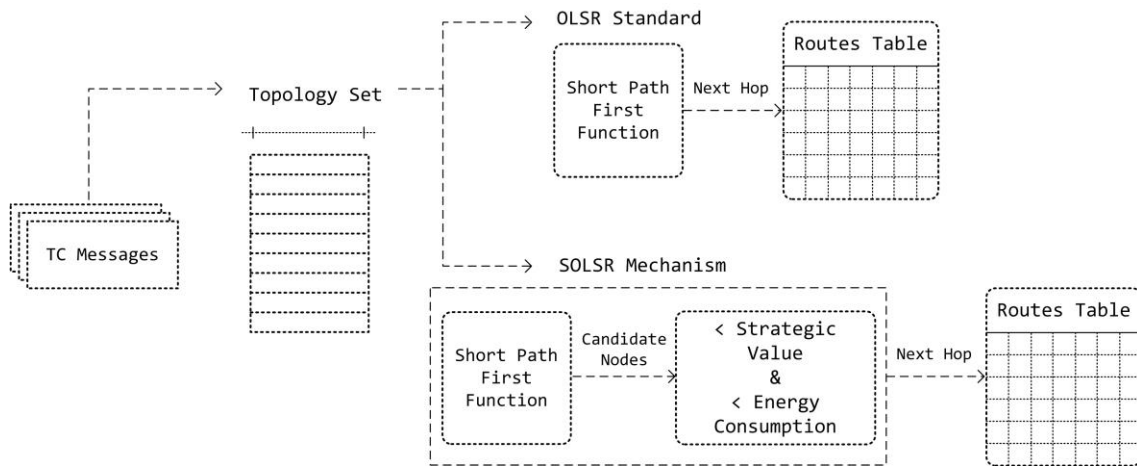


Figure 1. Descriptive diagram: Routing computation process carried out by the standard OLSR protocol and the SOLSR proposed mechanism

SOLSR Configuration on Linux

1. Download and decompress the *solsrd* package (olsrd routing daemon modification).
2. Run the script *energystatus.sh*, located inside the *cfigsolsrd* folder. This script enables the capture and saves to a file the information about the energy consumption (percentage value) from the energy management system. This information is analyzed by the SOLSR protocol for the routes set up.

```
./energystatus.sh &
```

3. In order to start with the installation of SOLSR, go to the main folder (*solsrd*) and run in the terminal (CLI) the commands list below:

```
$ sudo make
```

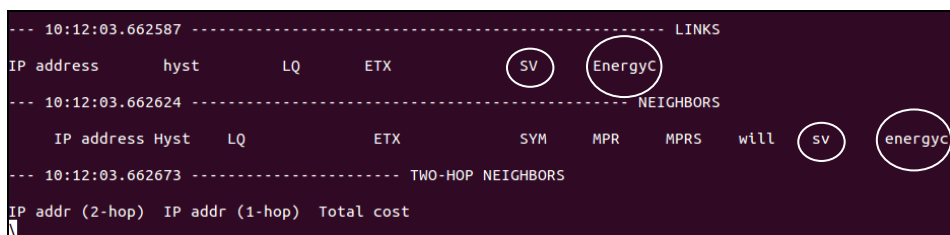
Once completed the compilation process, run the next command in the terminal:

```
$ sudo make install
```

4. The installation process generates a configuration file for the protocol operation (*/etc/olsrd/olsrd.conf*). The default parameters included in this configuration file are basic. Therefore, we recommend replacing this file by the configuration file available in the location *solrd/cfigsolrd/olsrd.conf*.
5. Following, in order to verify the operation of the *solsrd* routing daemon, run the next command in the terminal (location *solsrd* folder).

```
$ sudo solsrd -i wlan0
```

The protocol shows information about the strategic value (SV) and the energy consumption (EnergyC) metrics, as can be seen in Figure 2.



```
--- 10:12:03.662587 ----- LINKS
IP address      hyst      LQ      ETX      SV      EnergyC
--- 10:12:03.662624 ----- NEIGHBORS
      IP address Hyst      LQ      ETX      SYM      MPR      MPRS      will      sv      energyc
--- 10:12:03.662673 ----- TWO-HOP NEIGHBORS
IP addr (2-hop) IP addr (1-hop) Total cost
```

Figure 2. Capture of the *solsrd* routing daemon operation

6. Install the plugin *txtinfo* for monitoring the *solsrd* routing daemon operation. Run the next command in the terminal (location *solsrd/lib/txtinfo*):

```
$ sudo make
```

Once completed the compilation process, run the next command in the terminal:

```
$ sudo make install
```

7. Verify the plugin operation in the terminal:

```
$ echo /all nc localhost 2006
```

Additionally, inside the folder *solsrd/cfgsolsrd* it has been included a script (*monitor.sh*) which shows continuously information about the protocol operation.

8. Finally, according to the number of nodes and its location in a network, it is possible to verify the operation of the SOLSR mechanism through changes displayed by the monitor script about the SV and energy metrics.

References

- [1] S. González, P. Arce, and J. C. Guerri, "Simulation and testbed evaluation for optimizing energy consumption in ad hoc networks based on OLSR protocol," in Proc. of the International Joint Conference on e-Business and Telecommunications (ICETE), Conference on Wireless Networks and Mobile Systems (WINSYS), Lisbon (Portugal), Jul. 2016, pp. 129-136.
- [2] IETF MANET W.G, RFC 3626-Optimized Link State Routing Protocol (OLSR). [Online]. Available: <https://www.ietf.org/rfc/rfc3626.txt>. [Accessed:21- Oct-2016], 2003.
- [3] Olsr.org Projects, "OLSR daemon", Releases. [Online]. Available: <http://www.olsr.org/mediawiki/index.php/Releases>. [Accessed: 23-Jan-2017].