eCall: a life-saving technology – implementation in Finland

Risto Öörni, M.Sc.(Tech.)
Risto.oorni@vtt.fi

What is eCall?

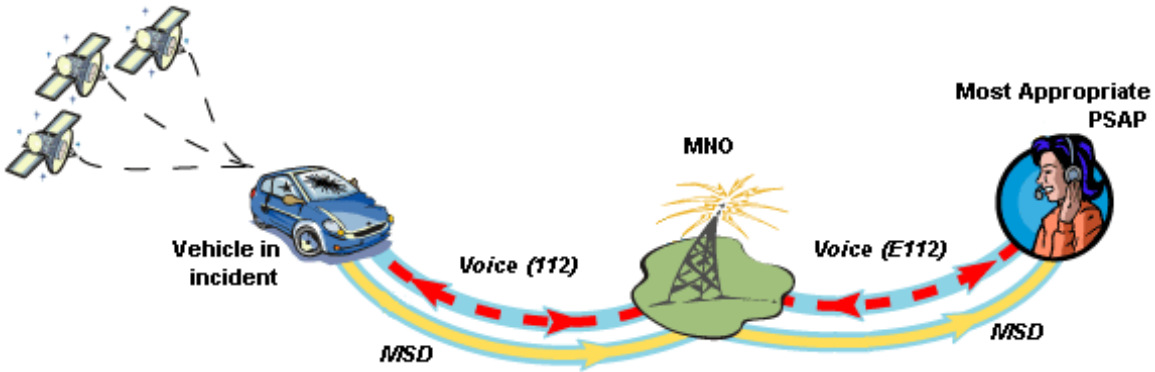
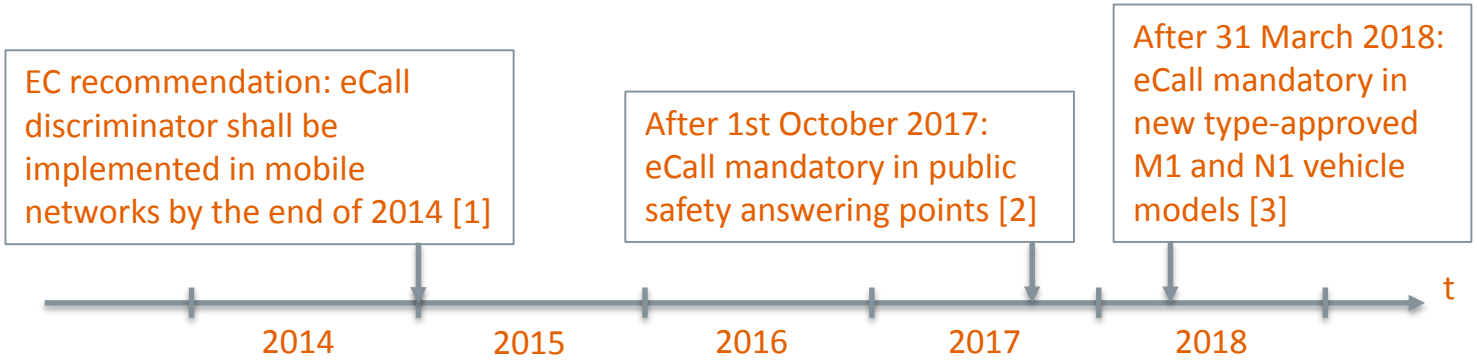


Figure: http://ec.europa.eu/digital-agenda/en/ecall-time-saved-lives-saved

- eCall is the European in-vehicle emergency call system
- The in-vehicle system (IVS) establishes an emergency call which is routed by the mobile network to the most appropriate public safety answering point (PSAP) answering 112 calls
- The minimum set of data (MSD) is sent by in-band modem in the voice channel of circuit-switched connection from IVS to PSAP, and a voice connection is opened
- eCall is expected to improve safety by reducing the severity of accident consequences

European regulation related to eCall implementation



- eCall implementation in PSAPs is mandatory in the EU member states
- eCall is mandatory in new type-approved M1 and N1 class vehicle models (cars and vans) in the EU area
- EC has issued a recommendation on the implementation of the eCall discriminator in 2G and 3G mobile networks

[1] Commission Recommendation (2011/750/EU)
[2] Decision No 585/2014/EU of the European Parliament and of the Council
[3] Regulation (EU) 2015/758 of the European Parliament and of the Council

eCall implementation in Finland

- eCall has been implemented in PSAPs, and a conformance assessment has been carried out
- All three MNOs have implemented the eCall discriminator (“eCall flag”)
- Over 15,000 new vehicles with eCall IVS have been registered by early 2019 in Finland [1]
- First eCalls have been processed by PSAPs

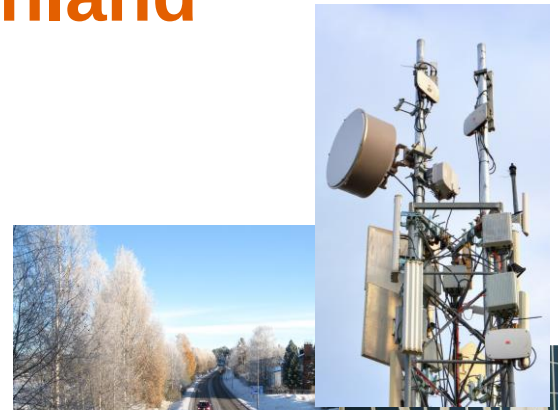


Figure: https://www.flickr.com/photos/luggi91/11824960576/ (CC BY 2.0)

Photo: Santeri Viinamäki, license: CC Attribution-Share Alike 4.0 International

Photo: Emergency Response Centre Agency, Finland

[1] Finnish Information Centre of Automobile Sector, according to estimates provided by car importers

eCall PSAPs in Finland

- There are 6 PSAPs receiving eCalls and other 112 calls in Continental Finland
- All 6 PSAPs are operated by Emergency Response Centre Agency, and they have the same information system
- The information system of the PSAPs (ELS) is being replaced with a new system (ERICA)
- All PSAPs process all types of emergency calls; PSAPs are staffed with civilian calltakers who perform risk assessment and dispatching of field units

Figure: http://www.pelastustoimi.fi/download/41748_Hatakeskukset_2015.pdf?9cbeeb7471e4d488

Operation of the PSAP

- eCalls are handled in a way very similar to other 112 calls
- The call taker handles the voice connection and receives data in the MSD
- Either the call taker or other PSAP staff (e.g. head dispatcher for rescue or police or the shift supervisor) may alert the field units to respond to the incident
- Operational procedures have been defined for eCall alerts

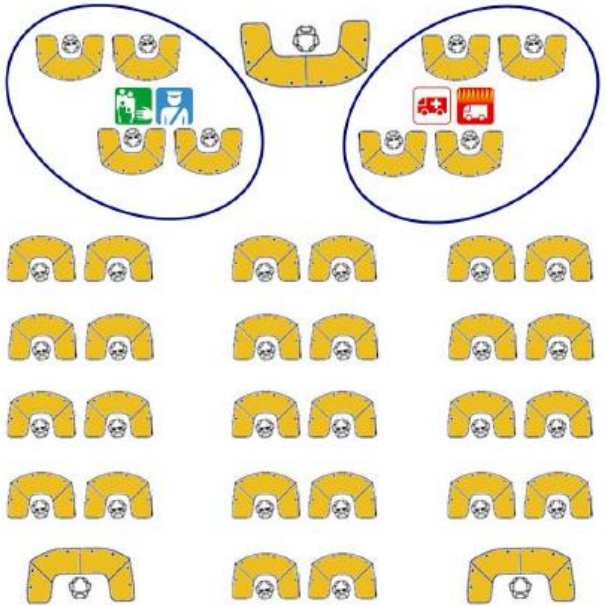


Figure: Managing Change: The example of Finland, From 15 centres to a network of 6 centres. EENA Case Study Document.

Communication with traffic management centre

- In case of a traffic accident, the PSAP sends the details of the accident to the traffic management centre of Traffic Management Finland
- Information on the accident is transferred automatically as XML
- Information on incidents on the Finnish road network is available as open data from the Digitraffic system operated by TMF (https://www.digitraffic.fi/en/road-traffic/)

Tampere Traffic Management Centre

Photo: Marjatta Udelius, Finnish Transpor Agency https://www.avi.fi/documents/10191/3011118/Udelius_Liikennekeskus_tapaninp%C3%A4iv%C3%A4nmyrsky.pdf

Photo: Finnish Transport Agency

Pile-up accident in Finland in 2012

First experiences with eCall in PSAPs

- eCall has been implemented in Finland on 24th October 2017
- Limited number of calls so far due to limited number of equipped vehicles
- A small number of ”ghost eCalls” has been received (112 calls with eCall flag but not from an eCall IVS)
  - The problem with “ghost eCalls” has been fixed with an update to mobile networks

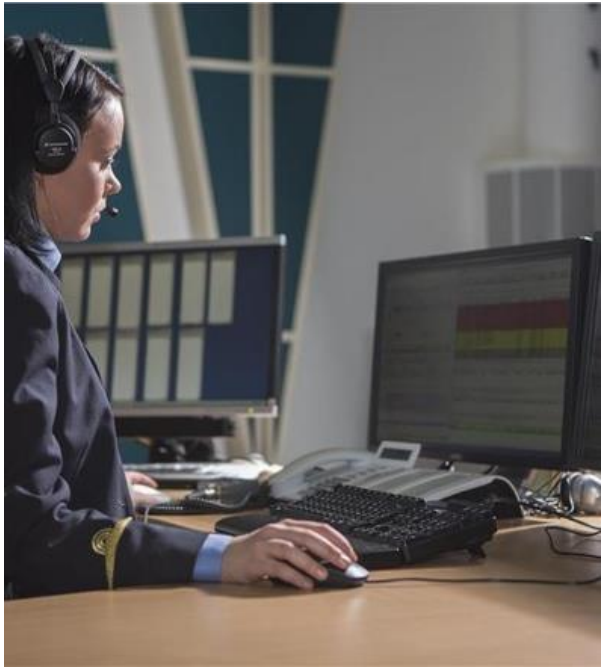


Figure: Emergency Response Centre Agency, http://www.112.fi

PSAP call taker using the ELS system and related equipment

In-vehicle emergency call services in neighbouring countries

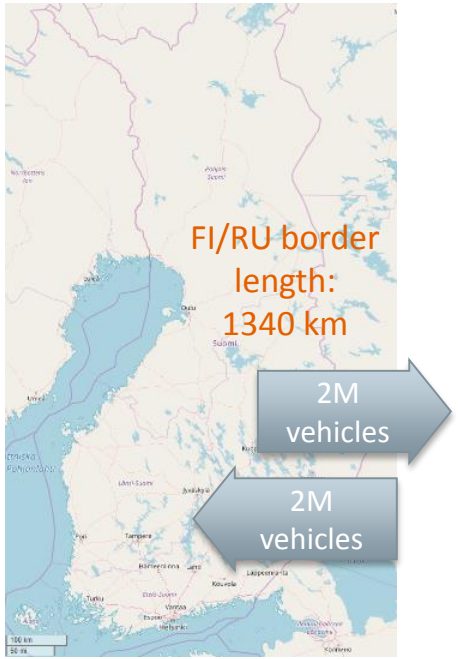
Country	Technology	Service operational (13 March 2019)	Procedures exist for transferring TS12 emergency calls	Procedures exist for transferring MSD
Estonia	eCall	Yes	No	No
Norway	eCall	No	Yes	No
Russia	ERA-GLONASS	Yes	No	Under study
Sweden	eCall	Yes	Yes	No

- Sweden and Estonia have implemented eCall [1,2], implementation is in progress in Norway [3]
- Russia has implemented ERA-GLONASS in-vehicle emergency call system [4]

[1] https://majandus24.postimees.ee/4454565/uus-ajastu-eesti-teedel-algas-autod-hakkavad-ise-abi-kutsuma
[2] https://www.sosalarm.se/ecall
[3] https://www.ksbedrift.no/aktuelt/brann-og-redning/110-sentralene-skal-motta-noedanrop-gjennom-ecall-systemet/
[4] https://aoglonass.ru/en/gais-ehra-glonass/

Interoperability with ERA-GLONASS

- Russia has implemented ERA-GLONASS in-vehicle emergency call system
  - eCall and ERA-GLONASS are harmonised but not identical
- Specification has been drafted for interoperability testing of eCall and ERA-GLONASS
- Interoperability tests have been carried out in Finland and in Russia, and first positive results have been obtained
- Work to advance interoperability is going on

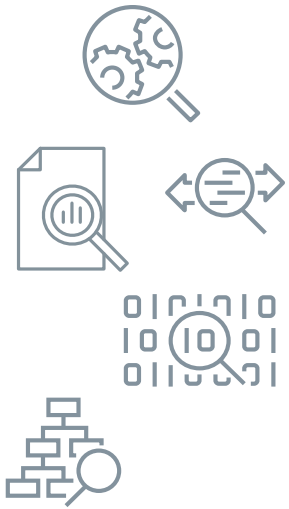


eCall testing in Finland

- HeERO (2013–2015):
  - validation of specifications of pan-European eCall
- I_HeERO (2016–2018):
  - conformance assessment of PSAP (ELS system)
  - eCall end to end tests
  - interoperability tests with Russian ERA-GLONASS in-vehicle emergency call system
- 2019
  - New conformance assessment will be carried out for ERICA
  - Finalisation of end to end tests with the ERICA system
- In future
  - Continuation of interoperability tests with Russian ERA-GLONASS

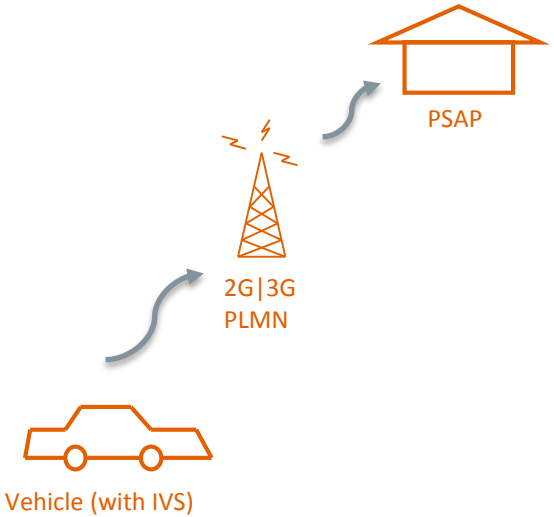
Experiences during conformance assessment of PSAPs in Finland

- Conformance assessment of the PSAP (ELS system) was carried out by VTT
- Conformance testing revealed faults that were then corrected; conformance assessment has therefore likely improved interoperability
- Different EU countries use different numbering schemes and therefore also E.164 numbers with different length
  - EN16454 does not indicate the type of SIM card that should be used for conformance tests, e.g. use of foreign or local SIM card
- eCall specifications allow but do not mandate the IVS to establish an eCall in limited service state after all network registration attempts have failed (EN16062, 7.12.2)
  - EN16454 does not include a test for routing and handling an eCall with no valid number of the calling subscriber (when the IVS is in a “limited service” state without network registration)



Experiences during eCall end-to-end testing

- In addition to conformance assessment, end to end tests have been carried out with the ELS system and three mobile networks
  - End to end tests will be continued after the roll-out of ERICA is complete
- End to end tests covering several PSAPs and mobile networks can detect faults that are not necessarily revealed in a conformance assessment carried out for a single PSAP
  - Human error with configuration of the eCall discriminator in a mobile network
  - Faults that occur in a non-deterministic way
  - Configuration problems specific to an individual PSAP or an individual MNO



Recommended reading

- http://iheero.eu, Harmonised eCall European Deployment
- http://www.heero-pilot.eu, Harmonised eCall European Pilot

- Öörni, R., Marinic, G., Beeharee, A., Linke, A. and Trosh, M. 2019. eCall for heavy goods vehicles. IEEE Intelligent Transportation Systems Magazine, article in press.
- Öörni, R. and Goulart, A. 2017. In-vehicle emergency call services: eCall and beyond. IEEE Communications Magazine, 2017, Issue 1, pp. 159-165.
- Öörni, R., Meilikhov, E. and Korhonen, T. 2015. Interoperability of eCall and ERA-GLONASS in-vehicle emergency call systems. IET Intelligent Transport Systems, Vol. 9, Issue 6, pp. 582-590.
- Öörni, R. and Korhonen, T. 2014. eCall MSD transmission – results from a field test in Finland. IET Intelligent Transport Systems, Vol. 8, Issue 8, pp. 639-647.

More information on ITS and C-ITS

- CAPITAL Online Training Platform: https://www.its-elearning.eu/
  - Provides online courses, webinars and training related to ITS and C-ITS

Thanks for your attention!

Risto Öörni, M.Sc.(Tech.)
risto.oorni@vtt.fi