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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Karst show caves – how DTN technology as used in space assists automatic environmental monitoring and tourist protection – experiment in Postojna cave" *by* F. Gabrovšek et al.

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Thank you for all the comments. We find them all very meaningful for improving our paper. We have already made changes in our paper according to suggestions. For details please read our answers to your comments.

As a supplement we are adding a revised version of the manuscript where all your comments are taken in to account as described here. Additionally, few other modifications have been made in order to improve the MS. These modifications are separately

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described in a answer_to_editor.pdf file which is part of the supplemet zip archive.

COMMENT: ÂżIn section 2.1 you describe the electric powered train that brings tourists into the caveand additionally functions as a DTN data mule in this experiment. As I was reading this I found myself wondering why the electric circuitry that powered the train could not additionally be used to data data signals, using power line communications technology. I suspect this is an ignorant question for which there is a ready answer, but I might not be the only ignorant reader of this paper; it might be helpful to include the answer here.Âń

ANSWER: Thank you for this good comment. We have overlooked this obvious matter because it was self-evident for us, but it will not be for others. Text in section 2.1 has been changed to: ". . . The infrastructure supporting tourist access includes an battery-electric powered train (without electric power line) which brings visitors about 2 km into the interior of the cave. The total length . . .".

COMMENT: ÂżThe first paragraph of section 5.2 seemed repetitive (see 5326/10 and 5330/10), suggesting that the paper might have been composed in part by cutting and pasting portions of earlier documents. Everybody does that, but it might be worthwhile to scan back through the paper and look for redundant text that could be excised.Âń

ANSWER: We agree that is very common (also for us at some occasions) to compose the paper by assembling it from portions of different earlier documents or reports. But this is not the case in this paper. Different sections had been written for specific fields of research trying to explain the experiment and results in comprehensive way for particular research field ranging from DTN technology, speleology to design of environmental automatic measuring systems. We think that some readers from specific field of research might miss something because we assume that they will skip some sections when they will recognize them not coming from their field of research. Before submitting the paper we have been discussing how to deal with this dilemma, but we decided to preserve current structure. But if you think that this is still too much distracting we

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will do it. Please let us know again.

COMMENT: ÂżIn section 5.3, line 19 of page 5339, the administrative bundle that acknowledges delivery of the data sounds like an end-to-end ACK from the destination to the originating node, which does not exist in DTN. You must be referring to a custody signal, which is not necessarily sent to the originating node. I don't know exactly how to clarify this in the text, but it might be good to do so.Âń

ANSWER: We did not paid enough attention before in the paper to this issue before. But after reading of your comment we suggest clarifying the relevant paragraph as follows: "...After a small number of encounters it is expected that the destination node will be encountered and the bundle delivered. However, depending on the mobility pattern, delivery is not absolutely guaranteed before the lifetime of the bundle expires. RFC 5050 allows the sender of a bundle to set flag bits in the Bundle Processing Control word (see section 4.2 of RFC 5050, Scott and Burleigh, 2007) to request acknowledgement that the bundle has been delivered to its destination. There are two options which either request the BPA to acknowledge that it has delivered the bundle to an application (bit 14) or request the application to send an acknowledgement when it receives the bundle (bit 6). In either case an administrative bundle is sent back to the source EID of the requesting bundle. Using these facilities allows the system to avoid loss of data by triggering a resend of the bundle if an acknowledgement is not received within a reasonable time, but note that this may be quite long depending on the expected delays in the system. The PRoPHET routing protocol also spreads acknowledgements of bundle delivery epidemically through the network with the intention of suppressing unnecessary replication of the bundle once a copy has been delivered. In principle, these acknowledgments could be used to trigger retransmission but this could entail a 'layer violation' as the routing protocol information would not normally be passed up to applications.".

COMMENT: ÂżIn section 7, I wonder if the schedule of train runs is sufficiently rigid to serve as a "contact plan", so that the transmitter could be awakened on a scheduled

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basis rather than by a beacon signal.Âń

ANSWER: This solution would be best if schedule would be rigid enough. Unfortunatelly this is not at all the case in our experiment. Text in section 7 of the paper has been added to explain this issue: Âż...Maintaining a permanent alert status for WiFi beacon transmissions is more power consuming than is really desirable. Using schedule of the mobile nodes (trains or tourist guides) passing by the station as "wake-up" event is not an option in our case because schedules are not rigid enough. Schedules are on daily basis adapted to current number of tourists which depends on the season of the year, current weather and other similar factors. There are also several different trains driving on the same railway not all equipped with mobile nodes, so it is not possible to plan when particular mobile node on train will pass the station at certain time. And in addition we have also use this train based use case as an example of more general problem of data transfer at arbitrary time drive-by encounter of static node and data mule."

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/1/C2077/2013/nhessd-1-C2077-2013-supplement.zip

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 5323, 2013.