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| **Council 2017Geneva, 15-25 May 2017** |  |
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| **Agenda item: PL 2.7** | **Document C17/70-E** |
| **12 April 2017** |
| **Original: English** |
| Report by the Secretary-General |
| E-voting |

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| SummaryThis document provides a summary of the findings of a study on the possible introduction of e-voting in PP elections.Action requiredThe Council is requested **to** **review** the report and, taking into account the challenges, costs, and benefits **to advise** whether the proposed mitigation measures would provide adequate security for the Member States to have sufficient trust in an electronic secret ballot process, and if so whether the secretariat should pursue, if supported by voluntary contributions, its testing at PP-18, in order to gain experience for its possible use at PP-22, noting the significant cost. \_\_\_\_\_\_\_\_\_\_\_\_ReferencesDocuments [PP-14/175](http://www.itu.int/md/S14-PP-C-0175/en); [C16/4](http://www.itu.int/md/S16-CL-C-0004/en); [C16/100](http://www.itu.int/md/S16-CL-C-0100/en) |

1. **BACKGROUND**

In line with PP Recommendation 8 of Committee 5 (document PP-14/175) and further to discussion during Council 2016 on documents C16/4 (Possible improvements of the roll-out of the PP) and C16/100 (Contribution from the United Arab Emirates), the secretariat has been requested “to conduct a study on the proposal of electronic voting and submit its finding to the next Council session” (i.e. Council 2017) “for decision by the Council to introduce electronic voting in the PP elections”.

**2. FEASABILITY STUDY**

Considering that many UN organizations are faced with addressing the introduction of e-voting, a small ITU team composed of staff from LAU, C&P, SPM, and ISD have met with and collected information from other organizations in Geneva. ILO decided against using an electronic system for the election of its Director-General. Presently, only WMO has trialed a secret ballot electronic system for election of its Secretary-General. Having learned mainly from the WHO process, which concluded its trials with the decision not to pursue e-voting, a short feasibility study (summarized below) was commissioned from the same company which had assisted WHO, and which has been advising EU countries, the EU commission, Switzerland, etc. on e-voting.

The conclusion of the feasibility study is that efficiency will primarily be achieved through improvements to the logistics of the voting process and that an e-voting solution may be very challenging to implement from an organizational point of view. The study however recommended two potential e-voting solutions:

a) the use of standalone voting stations or

b) delegates voting from their seats.

The ITU secretariat considers that **the preferred option for logistic reasons would be solution b**) where delegates would vote from their seat using a mobile device in a WiFi environment. However, such a solution will have an impact on the secrecy of the voting: anonymity, repudiation, verifiability, and traceability, etc. Ensuring that “***the vote must be cast-as-intended, transmitted-as-cast and counted-as-transmitted***” is, of course, crucial. In addition, a technical solution must ensure **adequate security of the mobile devices, the network, the storage of data and the algorithm**, in order for Member States to be willing to accept and trust replacing the current trusted paper based process.

**3. CHALLENGES, AND POSSIBLE MITIGATION MEASURES FOR AN E-VOTING SOLUTION**

**A. There are 4 important steps in a voting process to consider:**

1. **Identification** of the voter (by identity and accreditation)
2. **Casting the vote** (whether on paper or on an application on a mobile device)
3. **Transmitting the vote as cast** (whether carrying it personally and by dropping the ballot paper in the ballot box or transmitting it electronically over the WiFi)
4. **Counting the vote as transmitted** (whether assisting tellers by scanning ballots or solely with a computer based algorithm)

**B. There are several security issues in the current paper process that will need to be replicated:**

1. **Anonymity** (only the voter knows how he has voted)
2. **Verifiability** (the ability of the voter to verify how he/she has voted before casting and ability of the tellers to verify that a voter has voted )
3. **Non-repudiation** (the voter cannot contest that he/she has voted and the ballot has been counted)
4. **Non-traceability** (there is no connection between the vote cast and the voter, once the vote has been transmitted)
5. **Process auditability** (there should be no flaws in the process in identification, casting, transmitting, or counting)

**C. Changing from a paper process to an e-voting process will change some responsibilities**

In the paper and e-voting process the responsibilities are as follows:

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| **The 4 steps** | **Responsibilities in the paper based process** | **Responsibilities in the e-voting process** |
| 1 Identification | ITU team + the voter + the tellers | ITU team + the voter + the tellers |
| 2 Casting the vote | The voter only  | The voter **+ the application** |
| 3 Transmitting the vote as cast | The voter only + The tellers | The voter **+ the WiFi + the application** |
| 4 Counting the vote | ITU team + The Tellers + scanning ballot + report | ITU Team **+ the application algorithm calculating** the voting result |

**D. Trust in the process**

As can be seen from C) above, a new and additional element of shared responsibility, and trust in the process, will be required for the introduction of an application on a mobile device, the transmission of the vote electronically over WiFi, and the reliance on an algorithm for counting the transmitted votes.

The secretariat suggests the mitigation solutions below for the various challenges.

**E. Mitigation measures**

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| **The 4 steps** | **Mitigation measurese-voting process** |
| 1 Identification | 1. Distribution of random token for voting based upon identification and accreditation.
2. Distribution of random ITU mobile devices for voting
3. Only ITU devices (MAC address) can be connected for voting
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| 2 Casting the vote | 1. Application verifies that vote is not invalid, i.e. that it is indeed the vote that the voter intended to cast
2. Application submits ballot electronically
3. Application receives a receipt from the central service with a pdf version of the cast vote.
4. The voter keeps the mobile device and token until the record of the meeting and the voting result has been accepted by the meeting
5. Shortly after the voting result has been accepted, it should no longer be possible to re-verify which vote had been casted with which token
6. Development of application externalized
7. Application developed in open source for verification by Member States
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| 3 Transmitting the vote as cast | 1. Special WiFi for voting only
2. Communication encrypted
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| 4 Counting the vote | 1. Development of central application and algorithm externalized
2. Application developed in open source for verification by Member States
3. Data encrypted when stored in database
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**F. Other measures ensuring data integrity (at rest or in motion), application and network security**

* Monitoring
* Multiple servers – to verify that they all have the same information
* Dedicated network – independent network (servers/tablets)
* External audit

**G. Residual risk**

Despite the suggested mitigation measures in E) and F) above, Member States should bear in mind that there are **no absolute guarantees** that devices, applications, WiFi, algorithms, and data will not be compromised in a virtual environment**.**

As already discussed at the Council working group in February 2017, it is for the Council first, and then PP, to decide on what constitutes adequate security for Member States to trust an electronic solution.

**4. COSTS FOR A PILOT**

Based on the feasibility study report, simple polling solutions are already offered starting at EUR 25,000, but provide little to no security. The secretariat considers that, as such, these solutions cannot be used for the ITU elections. For full sophisticated solutions that meet the anonymity, verifiability, non-repudiation, non-traceability, and process auditability requirements of ITU, state-run Internet voting projects could serve as a basis for cost estimates. Here project costs range from some EUR 500,000 to EUR 8,000,000. These projects all vary in scope and technical sophistication, but they provide an impression of the range of costs.

To allow delegates to vote from their seats using an e-voting solution that meets the above-mentioned requirements, the additional non-staff cost would be between EUR 500,000 to 1,000,000, to cover the cost of the e-voting and security applications, servers, tablets, network infrastructure, etc. A significant amount of this cost is due to software licenses, which permits the possibility of auditing the source code by an independent party.

Internal costs for the e-voting project are a smaller factor but not marginal. Staff members from LAU, C&P, SPM, PROC, and ISD will all need to provide resources for the project. The total staff time required would equivalent to two full-time employees at P3 level from now until PP-22. Apart from the procurement, testing, and adoption of the e-voting solution, the General Rules of Conferences, Assemblies and Meetings of the Union (GR) could need to be updated. The election procedure and the role of the tellers also require revisions.

**5. SUMMARY**

The established paper ballot based election procedure of ITU is already very efficient. The average time required for the voting process was around 37 minutes and around 25 minutes for the vote counting during PP-14. Increased efficiency for the voting process would primarily be achieved through improvements to the logistics of the voting and tallying process and not by the introduction of an e-voting solution. The e-voting solution will reduce the vote counting time from 25 minutes to practically zero. However, due to the rule of six-hour (or even twelve hour) period between two voting rounds, the elimination of vote counting time only provides marginal improvement to reducing the total elapsed time of the entire election process.

Taking into account the challenges, costs, and time benefits of an e-voting system, the Council is requested to advise whether the proposed mitigation measures would provide adequate security for the Member States to have sufficient trust in the electronic secret ballot process, and if so whether the secretariat should pursue, if supported by voluntary contributions, its testing at PP-18, in order to gain experience for its possible use at PP-22, noting the significant cost.

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