Extension to the range of SI Prefixes: Update to the CCU

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Richard Brown
Head of Metrology
NPL
History of (SI) prefix coverage

Magnitude covered by SI prefixes, $10^x$

1875: CIPM 4
1900: CIPM 25
1925: CIPM 37
1950: CGPM 11
1975: CGPM 12
2000: CGPM 19
2025: CGPM 27

Note: The graph shows the progression of SI prefixes covering different magnitudes from 1875 to 2025.
Drivers for extending the range of SI prefixes

- Progress in science requiring coverage of an expanded range of magnitudes
- Increasing usage in communities where prefix range is not fit for purpose
- Ensuring unofficial names do not become *de facto* adopted

Always present:

Information technology
Information technology

- Data storage – and the non-SI units ‘byte’, ‘bit’, etc – need prefixes in excess of $10^{24}$, especially with the advent of quantum computing

- An area where the popular science media is active

- Yottabyte(s) (412k Google hits), Brontobyte(s) (114k), Geopbyte(s) (60k), Hellabyte(s) (76k)

- IEC prefixes are used significantly less

Fig. 1. Approximate number of times prefixes combined with ‘bytes’ or ‘byte’ appear on Google Scholar between 1992 and 2017 (inclusive, not including patents or citations); IEC prefixes (empty bars) and SI prefixes (shaded bars).
Google’s conversion calculator

- Google is already using ‘hellabyte’ for digital storage
Proposal to extend the range of SI prefixes

<table>
<thead>
<tr>
<th>Multiplying factor</th>
<th>SI prefix name</th>
<th>SI prefix symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10^{27}$</td>
<td>ronna</td>
<td>R</td>
</tr>
<tr>
<td>$10^{-27}$</td>
<td>ronto</td>
<td>r</td>
</tr>
<tr>
<td>$10^{30}$</td>
<td>quetta</td>
<td>Q</td>
</tr>
<tr>
<td>$10^{-30}$</td>
<td>quecto</td>
<td>q</td>
</tr>
</tbody>
</table>
CCU Consultation: 23 March to 20 November 2020

- Document pack circulated, containing:
  - Draft CCU Recommendation to the CIPM
  - Explanatory position paper (with Annexes)
  - Roadmap
- Circulated to CCU members, representatives of liaison organizations and guests
- LNE, CEM, NMIJ, NPL, PTB, IFCC and IUPAP responded
- All replies were positive and supportive of the proposals without change

- Bill Phillips, NIST: “I think you have done a thorough job in describing the needs and the arguments for this extension, as well as the limitations. I am in favor of these modifications. I am particularly happy to see the practice of capital letters for positive powers of ten and lower case for negative powers is being consistently continued. The inconsistent practice for the earlier prefixes is a constant source of irritation. Thanks for the work that you and your colleagues put into this.”
Progress with what has been agreed

✓ There is consensus that an extension to the range of SI prefixes is now appropriate
✓ It is sensible to use the remaining available letters in the alphabet before considering compound prefixes (which remain a future option)
✓ The approach to producing the names and symbols is consistent with recent precedent
✓ It is prudent to act now and put this decision to the 27th CGPM in 2022
✓ A draft CGPM resolution was reviewed by CIPM in June 2021 and feedback was received and acted upon (see: CCU/2021-07)
CCU Roadmap to extend the range of SI prefixes

We are here!
Next steps from the Roadmap

- Approval of the draft CGPM resolution at the 25th CCU meeting in September 2021
- Final approval of the draft CGPM resolution by the CIPM in October 2021
- Voting on the resolution at the 27th CGPM in November 2022
- If the vote is positive, implementation in the SI Brochure, communication and promotion