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To

All Stakeholders

Subject: Suggestion/Feedback on Draft Approach Paper for creating a Digital Address Code for each address in the country - reg.

Department of Posts is in the process of creating a Digital Address Code for each address in the country.

2.   In this regard, an Approach Paper has been developed on the approach proposed to be adopted by the Department for creating Digital Address Code. A copy of the Approach Paper is attached.

3.   Suggestions/feedback on the draft Approach Paper on creating a Digital Address Code (DAC) may be forwarded to the undersigned by posts or on e-mail i.d. ddgmb@indiapost.gov.in & devender.singh25@gov.in by 20th November, 2021.

Encl. Approach Paper on DAC

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1. Why Digital Address Code?

a) Online business transactions to be fulfilled by delivery at doorsteps, have seen an exponential rise after the onset of Covid 19 pandemic. Reaching the addressee by means of conventional addresses and landmarks is arduous. Sharing of location is often resorted to at the last mile. Such interventions can be avoided, if the address can be identified digitally and the digital address identity replaces the descriptive address needed for fulfillment of the business transaction.

b) Authentication of identity and address are needed for various business processes. Aadhaar is the digital identity platform that has facilitated online authentication of identity. A similar system for address authentication would simplify business processes. Geospatial coordinates can be used as the signature for authentication of addresses, similar to biometrics in respect of identity. Any random location on a digital map cannot be an address. An address represents a residence, business entity or monument. Hence there is a need for an identity to the address, linked to its geospatial coordinates, so that it can be irrevocably identified and authenticated.

c) Aadhaar is commonly used as proof of address. But, Aadhaar address cannot be digitally authenticated, since it does not have any attribute that can be verified with reference to the digital location. All address proof documents currently in use suffer from the same deficiency. An address that can be digitally authenticated must be linked to the digital location (geospatial coordinates) of the address. Such a digital address identity could be used for online address authentication.

d) Use of fake addresses is at the root of eCommerce customer frauds. There is a need for verified addresses linked to geospatial coordinates that can be authenticated online.

e) What is needed is an address identity that is unique, linked to geospatial coordinates and is usable by all stakeholders. Digital Address Code (DAC) is proposed as a solution. It would be an input that could be keyed in or captured out of a QR code by apps of service providers and would be cognizable by digital maps.

2. What would be the attributes of DAC?

a) DAC would be linked to geospatial coordinates representing the address. Coordinates at the entrance or gate to the address would represent the address for this purpose.

b) Exceptions: In respect of sensitive establishments whose geospatial coordinates should not be disclosed, DAC may not be issued or it may be linked to the coordinates of a 'neighborhood' or city. The concept of neighborhood is elaborated in this document. The same process would be applied to the DAC of addresses in respect of which the addressees do not want to share geospatial coordinates due to privacy concerns. In such cases, the addressees can use the neighborhood code and manage with descriptive addresses as is done at present for the last mile.

c) DAC would be unique for each address. "Address" would mean each individual dwelling unit or office or business. Some illustrations:

  a. Independent house will be one address with one DAC. If the house is partitioned into two, there would be an additional address with additional DAC. Depending on the area occupied by the undivided property and the standards used for capture of geospatial coordinates, the two DACs would be linked to the same coordinates or different coordinates.
  b. In an Apartment building, each individual apartment would be allotted DAC. They will be linked to the geospatial coordinates of the entrance to the Apartment building or block.
  c. A corporate office or a government office complex would also have multiple DACs linked to the geospatial coordinates of the building in which the offices are located.
  d. In respect of apartment buildings and office complexes, the DACs have to be mapped to the respective apartments/ offices to locate the specific apartment/ office represented by the DAC.

d) DAC would be permanent for each address. If the property representing the address gets mutated into multiple addresses each of the new addresses would be allotted new DAC.

e) Directionality and intuitiveness are desirable characteristics of any address. An address is used to locate a physical entity for the purpose of effecting delivery,for attending a meeting and so on. Hence a good address would give a sense of direction or orientation.

3. **Scope of Digital Address:**

   a. Digital Address could be defined as a unique, standard and permanent identification of a physical address on a digital map. The address needs to be differentiated from the addressee. The digital address is an attribute of the physical address. The same address could be associated with multiple addressees. While the address is unique, the addressee is not, in the context of addressing.

   b. Digital Address would enable locating an address, not addressee. Typically, for a consignment to reach the consignee (addressee), one needs the name of the consignee and the address of the location where the consignment has to be delivered. Digital address takes care of the latter. A combination of the name of the addressee (consignee) and the digital address would enable the delivery of a consignment.

   c. Changeable parameters like street numbers/ names, colony names etc. would not become a part of the Digital Address.

4. **Designing Digital Address Code (DAC) for India:**

   a. An address comprising references to physical attributes like roads etc would easily get outdated and hence would not meet the permanence criterion. Digital address code would be a unique numeric or alphanumeric representation of the geospatial coordinates. A random code linked to geospatial coordinates, would be abstract. There is a need for a code that is standardized, directional and intuitive.

   b. In the Indian context a numeric code is desirable, vis-à-vis alphanumeric codes, considering the multitude of languages. Moreover, numeric codes are better suited for IVRS.

   c. DAC is expected to identify each address uniquely and link the address to its geospatial coordinates. In order to make the DAC intuitive, two approaches are proposed:

      i. DAC with state code: First two digits of the PIN codes in India indicate the state. State codes could be derived from the PIN code schema. The disadvantages with this approach are:

         1. Two digits will be taken up upfront, elongating the eventual DAC, which is avoidable.

2. Although there would be adequate redundancy to allow for creation of new states, there would be an en masse change of DAC which violates the permanence principle of DAC.

ii. Generation of DAC using geospatial workflow: In this approach, the territorial jurisdiction of India can be represented with digits from 0 to 9 as illustrated in Annexure 1. (it would not be necessary to use all digits; a couple of digits could be reserved for redundancy). By adopting an appropriate geospatial workflow calibrated with habitation density or population density, it would be possible to develop an architecture to digitally identify and allocate DAC to a group of addresses or even individual addresses.

Considering the advantages of an automated process and the disadvantages of using state codes, the second approach is considered appropriate and discussed further.

d. The number of digits to be used in DAC needs to be assessed. There are approximately 35 crore (350 million) households in India. Taking into account businesses and other non-household locations, the number of addresses could be estimated at 75 crore (750 million) which could be further safely approximated at 100 crore (1 billion). With 11 digits, it would be possible to cover 100 billion addresses. Hence it is proposed to have 11 digits + 1 check digit, totaling 12 digits.

e. There can be two approaches to the rest of the digits of the DAC:

i. Allocate random numbers:In this approach, 10 random digits will be appended to the initial digit (0 to 9) ensuring uniqueness of the 11 digit number so generated. The DAC so generated would lack inherent intelligence or directionality.

ii. Allocate numbers following an appropriate geospatial workflow: The geographical area of India is 3.287 million sq kms. A seven digit number would be able to cover 0.3287 sq kms or a square of 573 metres, if the geographical area is evenly sub-divided.In reality, there would be sparsely populated and densely populated regions. There would be large water bodies and reserve forests that would not be having any address. By adopting an algorithm that uses habitation/ population density, it would be feasible to design a geospatial workflow that allocates the subsequent digits on the basis of habitation density.

f. DAC is the standardized representation of a descriptive address, linked to the geospatial coordinates. Since it has to guide the user to the destination, it is not confidential. Disclosing a combination of addressee and the address, without consent, would be a breach of privacy, not the address per se.The second approach that provides a standardized representation of the descriptive address and is directional, is considered appropriate and is discussed further.

g. In densely populated areas, the area per address could be as low as 3 to 5 sq m (In multi-storied apartments the ground area is shared by the individual apartments). In sparsely populated areas there may not be addresses in several kms also. Formation of grids with uniform geographical areas like 5mx5m etc is not very useful in such a scenario.There is a need to design a solution that takes into consideration variations in habitation density. Hence, it is proposed to design a geospatial workflow solution that can identify non-linear 'grids'comprising approximately 300 addresses.

h. In the proposed design, it can be seen that each 'grid' would be essentially be an agglomeration of around 300 addresses. Each such agglomeration is proposed to be termed as a neighborhood. As a design criterion, it is proposed to allocate 4 digits to identify addresses in a neighborhood. The DAC of the neighborhood would end with 4 zeros. The DAC that will be allocated to a neighborhood by the system would be something like: xxxxxxx0000c, where c is a check digit. Going by an estimated 75 crore addresses currently, the number of neighborhoods in India would be around 25 lakhs.

i. The last 4 digits in respect of the addresses within a neighborhood are proposed to be allocated with a system driven consent process, to uniquely identify the address. Until such time, all addresses within a neighborhood would end with '0000'. Allocation of DAC up to neighbourhood level is proposed to be by an automated process.

j. Unique identification of addresses would be an important national infrastructure. Apart from the utility for the logistics and the eCommerce industry, it would be an important tool in targeting social sector benefits. In order to be inclusive, even the smallest dwelling unit would get DAC. Hence satellite imagery with 5 m resolution is proposed to be used.

k. It is possible that new cities may emerge in sparsely populated areas. The proposed schema would be able to allocate DAC in such scenarios, without altering the DACs already allocated in other areas. In order to ensure such redundancy, it is proposed to reserve two digits in each of digit-places from

digit 2 to digit 7 of DAC. This strategy will ensure that directionality is sustained in the DAC schema.

l. Since the DAC would be linked to the geospatial coordinates of the address location, it would be feasible to locate any physical address accurately on a digital map, without having to provide any other information like name of city/ locality/ street/ door number etc.

m. Digital address code (DAC) is expected to fulfill the requirements put forth regarding One Nation One Address (ONOA) by Working Group of Ministers on Employment Generation and Skill Development dated 22 Oct 2020.
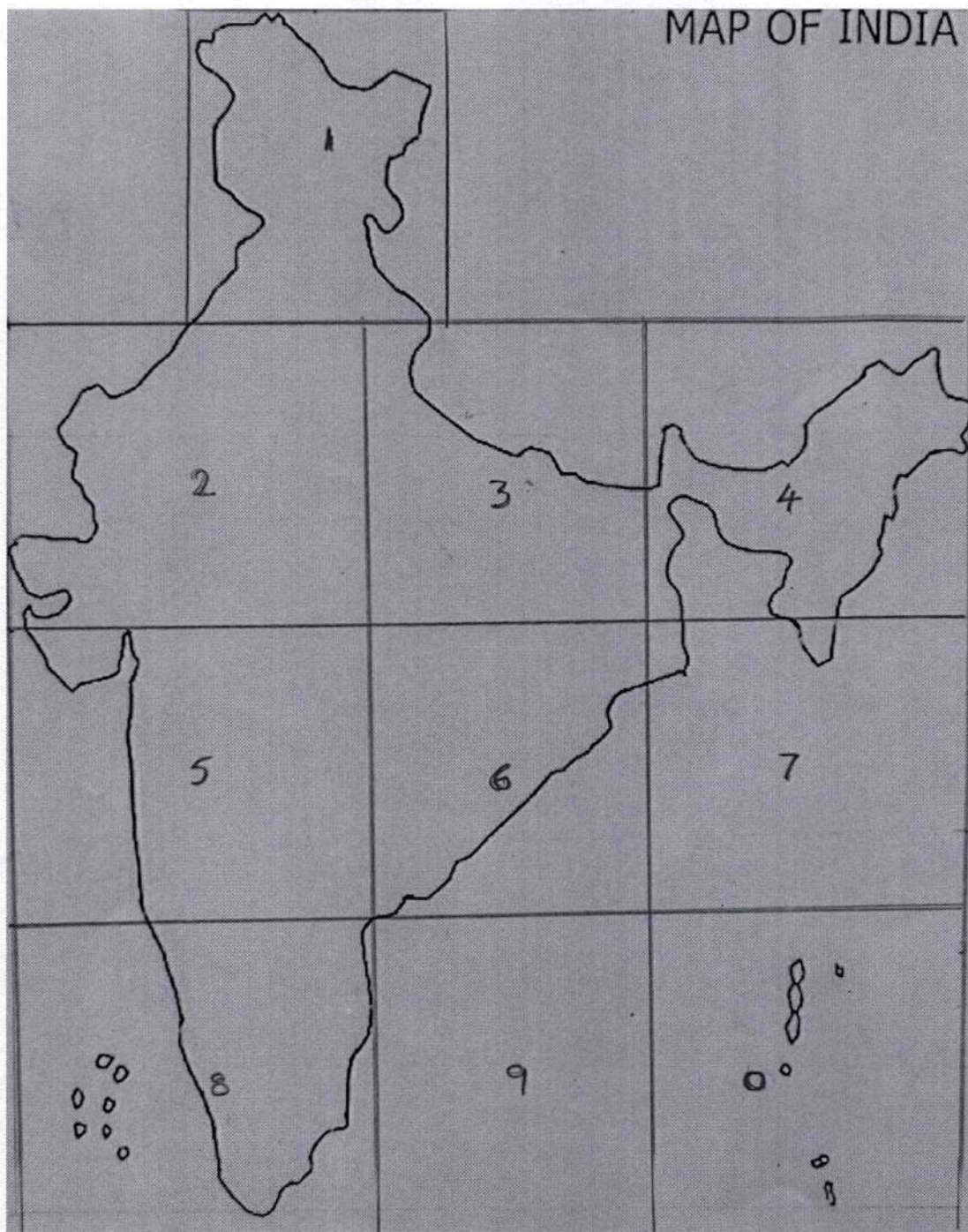
5. **Value Additions:**

   a. There would be a process for verification of DACs. Verified DACs would be eligible for online address authentication service.

   b. Address changes can be easily notified by changing the DAC associated with the addressee.

6. **Benefits of DAC:**

   a. The proposed DAC would be linked to geospatial coordinates. Address authentication could be provided as online service. It would be an important step forward in Ease of Living. KYC verification process in business sectors like banking, insurance, telecom etc. would be simplified. This would further result in reduced cost of doing business. DAC online authentication combined with Aadhaar authentication would be a truly digital eKYC.

   b. DAC would lead to higher productivity and quality of service in delivery services, especially eCommerce.

   c. Adoption of DAC would lead to increased financial and administrative efficiencies across sectors like property taxation, emergency response, disaster management, election management, infrastructure planning and management, census operations and grievance redressal.

   d. DAC would simplifydelivery and implementation of Government Schemes.

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MAP OF INDIA