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Economic Commission for Europe**Inland Transport Committee****Working Party on Rail Transport****Group of Experts on Permanent Identification of Railway Rolling Stock****First session**

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Development of the Unique Rail Vehicle Identification System**Comparing asset identification systems in the Transport Sector****Submitted by Rail Working Group*****I. Introduction**

1. Transport and logistics can rightfully be described as the backbone of international trade. Often the vessels supporting exchange are as valuable, if not more so, than the cargo they carry. For this and other reasons of public policy and financial security, the reliable and unique identification of ships, containers, aircraft, automobiles and rolling stock has long been important.

2. This briefing note is intended to provide background on how the different sectors deal with the identification issue. Both the current landscape and evolution of these practices is not linear, but rather the product of coordinated international policymaking. The experiences of developing other unique numbering systems may be useful for the railways, particularly as the industry is rapidly evolving thanks to its outstanding green credentials and increasing private financing and operation of rolling stock.

II. Maritime

3. The main global standard for uniquely identifying ships is maintained by the International Maritime Organization (IMO), a London-based specialized agency of the United Nations (UN). Roughly 50 years ago, they began work on their Ship Identification Number Scheme – now known simply as IMO Number – which has become an integral part of the ocean business. Since 1996, IMO Numbers have been required under the International Convention for the Safety of Life at Sea (SOLAS) of 1974 for all cargo ships of 300 gross

* This document was scheduled for publication after the standard publication date owing to circumstances beyond the submitter's control.

tonnage and above as well as all passenger ships of 100 gross tonnage and above.¹ Initially, IMO Numbers only applied to merchant ships. Through cooperation with the Food and Agriculture Organization (FAO), a Rome-based specialized agency of the UN, the IMO's highest governing body agreed to extend their applicability to smaller fishing vessels.²

4. IMO Numbers not only identify ships, but also registered ship owners and management companies. They consist of the three letters "IMO" followed by a unique seven-digit number. The IMO Number securely identifies the vessel largely because it does not change when the owner, country of registry or name changes. The ship's certificates must also bear this unique identifier. These regulations have improved maritime safety and moreover have reduced fraud. Since 1 July 2004, passenger ships are also required to carry the marking on a horizontal surface visible from the air, further aiding the speed and usability of this system

5. IMO Numbers may be the most widespread and powerful system for identifying relevant actors in the maritime industry, but they are not the only framework in use. For vessels navigating European inland waters, there is the ENI Number (European Number of Identification or European Vessel Identification Number) which is a unique, eight-digit identifier that is attached to a hull for a vessel's entire lifetime, independent of the vessel's current name or flag.³ Furthermore, there is the Maritime Mobile Service Identity system, which is a series of nine digits that are sent in digital form via radio to uniquely identify ship stations, ship earth stations, coast stations, coast earth stations, and group calls.⁴

6. A unique system for shipping containers operating internationally is also in use. The technical name for this container numbering system is ISO 6346, but is colloquially referred to as the BIC Number, because the standard is managed by the Paris-based International Container Bureau (BIC). There are four parts to a BIC Number:⁵

- (a) Owner Code, which is represented by three capital letters of the Latin alphabet.
- (b) Equipment Category Identifier, using one capital letter of the Latin alphabet (for example, U – for all freight containers, Z – for trailers and chassis);
- (c) Serial Number, which consists of 6 numeric digits assigned by the owner or operator, uniquely identifying the container within that owner or operator's fleet;
- (d) Check Digit, which consists of one numeric digit providing a means of validating the recording and transmission accuracy of the owner code and serial number.

7. BIC Numbers are also extensively used by international customs conventions, in order to temporarily admit freight containers. Advances in digital technology have also led to the creation of a Global Container Database (known also as BoxTech), which allows for voluntary registration of BIC Numbers. A prospective registrant is asked to submit their respective BIC Numbers, as well as the technical characteristics of each unit. The database is available for stakeholders via application programming interface (API) and has been broadly adopted. Currently, three of the top four maritime shippers in the world by tonnage load their fleets using this optional registration. With the new possibilities offered by the Internet of Things (IoT), the use of such online databases is positioned for growth.

III. Aviation

8. Aircraft, much like ships but unlike railway rolling stock, benefit from a long tradition of national registries. There are essentially two identification systems. Under the 1944 Chicago Convention⁶ a national aircraft registry issues an aircraft identifier, known as a tail number, when an aircraft is registered with it, in accordance with rules prescribed by the

¹ www.fao.org/global-record/background/unique-vessel-identifier/en.

² Ibid.

³ <https://help.marinetraffic.com/hc/en-us/articles/215590437-What-is-the-ENI-Number->.

⁴ www.marineinsight.com/marine-navigation/what-is-maritime-mobile-service-identity/.

⁵ www.iso.org/standard/20453.html

⁶ Article 37 of the Convention on International Civil Aviation.

International Civil Aviation Organization (ICAO), an agency of the United Nations. The main purpose of those systems is supporting operations and regulating air traffic. Generally, aircraft will not be permitted to fly without a tail number. The national aviation authority administering the national aircraft registry is responsible for supervising the airworthiness of the registered aircraft. Currently 32 European states work under the rules for certification and airworthiness of aircraft set by the European Union Aviation Safety Agency (EASA). National registries also show the owner of the aircraft corresponding to the tail number and often also show liens and mortgages on the aircraft. However, tail numbers are in many ways like car licence plates: they will change if an aircraft owner changes and it wishes to register the aircraft in another national registry. Accordingly, registries will usually also show, for a registered aircraft, the manufacturer name, model description and serial number and this identifier will be shown on documents of title and documents showing the transfer of title to, and liens placed on, aircraft.

9. The insecurity of the tail number has meant that the 2001 Aircraft Protocol to the Cape Town Convention on International Interests in Mobile Equipment (the Cape Town Convention)⁷ requires registration of security interests at the international registry in Dublin by reference solely to the manufacturer name, model description and serial number.⁸ This is quite straight forward bearing in mind that there are less than 50,000 aircraft currently operating and a relatively small number of aircraft manufacturers.

IV. Automotive

10. Like aircraft, motor vehicles have a transitory identifier, the licence plate, when operating on normal roads which will be registered at a national registry, but all motor vehicles, today numbering more than one billion, are manufactured with a unique code called a Vehicle Identification Number (VIN).⁹ Numbers are assigned by the manufacturer according to international convention. The obvious use of such a number is that when a model reaches mass production, tracking individual units becomes easier with a unique identifier.¹⁰

11. The code is specific to the vehicle and 17 characters long, both alphabetic and numeric, without intervening spaces, as visible above. “The letters I, O, and Q are not used to avoid being mistaken for numerals”.¹¹ The European Union has adopted a similar but less stringent regulation for VINs. European VINs do not require a year or factory digit. VINs conform to two international standards, ISO 3779 2009 and US Standard FMVSS 115.¹²

12. The VIN system was standardized and popularized globally over the course of decades-long policy discussions. Indeed, it only became “a fixed format common to all motor vehicles sold in North America after 1980”.¹³ The VIN system – or more accurately, systems – started in 1954. These first VINs came in a wide variety of formats because each individual manufacturer used their own numbering system. This is not unlike railway rolling stock manufacturing today. This approach continued until the first attempt in 1968 to create a unified scheme. FMVSS (Federal motor vehicle safety standard) No. 115 mandated that all passenger vehicles have a VIN permanently affixed “on a part of the vehicle visible through the glazing by a person standing at the left windshield pillar.”¹⁴ Manufacturers were also forbidden from repeating any VINs within a 10-year period.

13. As the quantity and variety of vehicles increased in the early 1970s – in particular by growing numbers of heavy trucks – a joint effort was launched in 1976 by the leading industry

⁷ In force since 2006 and now adopted by close to 80 states.

⁸ Article 7 of the Aircraft Protocol.

⁹ <https://info.gapless.app/en/blog/what-is-a-vin-why-its-important-to-know-your-cars-vehicle-identification-number/>.

¹⁰ www.quadratec.com/jeep_knowledgebase/article-101.htm.

¹¹ <http://modernvespa.com/forum/wiki-vin-decoding>

¹² www.infrastructure.gov.au/vehicles/imports/vins.aspx.

¹³ <http://modernvespa.com/forum/wiki-vin-decoding>.

¹⁴ www.federalregister.gov/documents/2008/04/30/08-1197/vehicle-identification-number-requirements#h-11.

association Motor Vehicle Manufacturers Association and Volkswagen of America to expand and improve the system. The VIN number was expanded to 17 characters and new classes of vehicles were introduced. The system was finalized in 1978 with a rule of implementation that mandated “beginning with the 1981 model year, National Highway Traffic Safety Administration would require that all over-the-road-vehicles sold must contain a 17-character VIN in a fixed format.”¹⁵ Furthermore, no two vehicles manufactured within a 30-year timeframe were allowed to have matching numbers.

14. The original core purpose of the VIN was not just efficiency, but safety. These safety concerns are manifest in two situations: theft and vehicle recall. The VIN acts as a deterrent against thieves who in earlier times could have easily disguised the identity of a stolen car. During safety recalls, themselves an extremely important security mechanism, all manufactured vehicles can be tracked and attended to.

15. VIN Numbers are no longer the exclusive domain of law enforcement or recall databases. They are also used for compliance with federal regulations, vehicle registrations, insurance and crash reports. If one is looking to buy a used vehicle, VIN check services can allow one to see if it has ever been in an accident, recalled by its manufacturer, how many times it has been bought and sold and many other details. It is essential for establishing trust with a potential buyer and providing reliable information.

V. Rail

16. Unlike the shipping, container, aircraft and automotive sectors, there is no common global system for identifying railway rolling stock nor any permanent unique numbering system.

17. Current identification systems are either national or regional systems and are often referred to as running numbers. A Europe-wide solution for identifying conventional rolling stock has been in place for several decades. Originally numbers (sometimes also referred to as RIV numbers (for freight rolling stock), RIC numbers for passenger rolling stock or EVNs – European Vehicle Numbers) were allocated under regulations issued by the International Union of Railways (Union Internationale des Chemin de fer or UIC). Since the 1960s, UIC numbers have been used for all registered vehicles moving to and from the continent but they could, and often did, change in relation to any rail vehicle. From 2006, the numbers were taken over under an EU regulation and now relatively rarely change but can still do so. Since 2008, the system also applies to newly built or converted UK rolling stock. UIC numbers are 12 digits long and convey comparatively ample information, including but not limited to country codes, interoperability codes and type codes.¹⁶ UIC numbers now also incorporate a further identification system for rolling stock owners required for use across the European Union and in all Member States of the Intergovernmental Organisation for International Carriage by Rail (OTIF): Vehicle Keeper Marking, a unique code consisting of 2 to 5 letters.¹⁷

18. The Organisation for Co-Operation between Railways (OSJD), which covers 28 CIS and other Asian states as well as the People’s Republic of China, adopted the same 12-digit numbering system in 2004 after extensive regulatory cooperation with UIC.¹⁸

19. North American railways use the Umler (Universal Machine Language Equipment Register) system, which is the repository of registration of all railcars operating in North America.¹⁹ The Umler System is a secure platform for equipment managers to report and share a variety of data with logistics partners and customers. It is managed by the Business

¹⁵ Ibid.

¹⁶ www.ltsv.com/w_ref_codes_uic.php.

¹⁷ <https://utk.gov.pl/en/railway-vehicles-and/rail-vehicles-registrat/vehicle-keeper-marking/13006,Vehicle-Keeper-Marking-VKM.html>.

¹⁸ OSJD Reference Document, O+P 582-1 “Designation of Passenger Wagons”.

¹⁹ www.progressiverailroading.com/mechanical/article/New-UMLER-system-will-enable-car-owners-to-communicate-more-clearly-and-quickly-Railinc-says--20810.

Services Division, Rail Inc. All units registered in the Umler System are subject to an annual maintenance fee.

20. The system identifies internal and external dimensions, capacities, weight information, and other specific characteristics of freight cars as well as intermodal trailers and containers. It also serves as the base file for other standard industry equipment reference and management systems. Railroads, equipment owners, agents, shippers, ports, suppliers, industry consultants, government agencies and railcar service providers use Umler for the safe and efficient placement, movement and interchange of railcars.²⁰

21. In Asia, the running numbering system is usually dictated by national regulations. The position is similarly un-coordinated in Africa. In the South Africa for example, the running numbers are often allocated by the operators.

22. There are a number of limitations arising from this system:

- Running numbers are purely regional in nature. This means that when a unit of rolling stock is exported outside of these regions, the identity of the unit is lost. For example, if a standard-gauge wagon is sold by the Italian asset manager to the Ethiopian lessor and then leased to the French operator, the identity of the asset would have been reassigned twice. Global unique identification is therefore not currently possible. Moreover, different rolling stock in different regions could have the same identification number
- Running numbers can change even within a region and can be recycled. Thus, there is no certainty that the current running number will always be the descriptor for an item of rolling stock and a number could be unique when issued but not unique permanently.
- There is no common format. In some countries, the numbering system will be numeric, in some alphanumeric, with differing lengths. This makes any global recording system very difficult, particularly if numbers and letters are respectively non-Latin and non-Arabic.
- It is difficult to track rolling stock moving from one regional system to another with different numbering modalities.
- These systems do not encompass all railway rolling stock. Equipment including but not limited to trams, metro trains, light rail units, funiculars and mountain rail equipment, harbour gantries, monorails and rail-based maintenance equipment and mining cars are outside of the numbering system. A global system that incorporates all vehicles that operate on, above or below a guideway could potentially be more useful.

23. In theory the rail industry could emulate the aviation sector by identifying rolling stock by reference to the manufacturer's name, model number and serial number. In practice, this is not possible. It is conservatively estimated that there are 6 million items of rolling stock worldwide. There are thousands of manufacturers of rolling stock globally with very different customised identification systems and no system to guarantee that they are unique when issued and remain permanently unique.

24. The Luxembourg Rail Protocol to the Cape Town Convention, which is expected to come into force in 2021, envisages, for the first time, a common global permanent, unique and non-recyclable 16-digit Arabic numeric identifier, known as the URVIS²¹ number. This number will apply to all forms of rolling stock and will be issued on demand by the international registry established under the Luxembourg Rail Protocol under regulations issued by the treaty's Supervisory Authority.²²

²⁰ <https://public.railinc.com/products-services/umler-system>.

²¹ Unique Rail Vehicle Identification System.

²² Detailed review of the URVIS numbering system is at www.railworkinggroup.org.nova.ch-meta.net/wp-content/uploads/docs/r0594.pdf.

VI. Conclusion

25. With the steady increase of private ownership and private financing of all types of transportation equipment, it will be essential to be able to identify equipment uniquely and permanently. For financiers, this is particularly important since they must be able to unequivocally identify their collateral. A unique vehicle numbering system also brings other clear benefits, including facilitating predictive maintenance, easier global insurance cover, lifetime monitoring as well as real-time tracking of the location and status of the equipment concerned. Except for the rail sector, there are unique ways of identifying all major forms of transportation equipment. In the post-COVID world, with an increasing focus on investment in environmentally friendly transportation, the railways have a critical role to play. The new URVIS numbering system, to be introduced through the Luxembourg Rail Protocol, will bring identification of rolling stock in line with the identification systems in place for the rest of the transportation sector and, by facilitating private finance worldwide, will play an important part in supporting the railways in the decades to come.
