Dear Ladies and Gentlemen,

Welcome to Sydney!

I'm pleased to welcome all of you to the 5th **UIC Asia-Pacific Workshop on Control Command Signalling and Telecommunications**.

I thank you all for being here, contributing to this important event. We designed it to be a <u>free place of exchange on key topics</u> for the future of Control Command Signalling and Telecoms systems in the rail sector.

The cost effectiveness and the sustainable performance of the railways are our strength and well under the political spotlight in the world. We know the potential of further growth of rail transport, now allowed by the digitalisation, the automation of driving, the optimisation of the various parts of the rail system and of course of the CCS-Telecommunications sector. We also know how big our planet is and how sometimes the geographical distances may become an obstacle for the harmonisation of railways. Yes, of course our business can have different characteristics from one region to another, some railways have specialised their offer in freight, some others in high speed services or in commuter trains… but in the end , for each business, there is a common set of enablers that really matter: an efficient infrastructure with reduced maintenance costs, smart rolling stock capable to address and even anticipate the future needs of rail transport (from passenger connectivity to the supervision of high value goods…), an efficient and cost effective traffic management system etc.

At UIC we strongly believe that it's in the utmost interest of all the railways worldwide to define and share a common vision on the future and work together to let it arrive with maximum benefit

for every member, even the smallest one. We are fully convinced of the need to push for better and better standardisation of basic modules of rail system and their interfaces, as only in this way will we be able to get the highest quality at lowest prices i.e. by stimulating a <u>fair and worldwide competition</u> among the rail suppliers.

We know how important it is to keep the rail system and its components balanced with one another and how much care it needs to modify a piece of the "puzzle" with regard to all the neighbouring pieces. Well, indeed sometimes we have to modify a piece, because of its technical obsolescence, better cost effectiveness of other solutions, different business case etc… When doing so we have basically two ways: look at our own needs, start our own research projects, put our own money on them, find our solutions and hope the others will follow… OR we can federate our efforts and go, together, toward a common shared direction, built upon International Rail Standards and Solutions (IRSs). This last way will take some more time but it's worth the extra effort. There is quite a well-known African proverb, actually from Kenya, that explains this choice quite well: "If you want to get first, run alone; if you want to get far, walk together."

At present there's an important project that can be considered as an emblematic example: FRMCS. The Future Railway Mobile Communication System has been started in Europe, looking to the announced end of technical life of GSM-R but it's been receiving a lot of interest and requests of participation from many other members out of Europe, notably China, India, Korea and others; FRMCS will also replace radio systems used in urban rails, so it will ideally offer a solution for the parallel obsolescence of the other main digital radio system used in the rail: TETRA.

It's a very good example of worldwide cooperation, where UIC is acting and will continue to be the reference authority for the Users' Requirements.

Control Command Signalling (CCS) at the heart of the railway system

As you all know, the rail system is functionally and technically an "Integrated system", we may also say a "system of systems" and rail Control-Command-Signalling is at its heart, like in the "Vitruvian man" of Leonardo da Vinci. Leonardo was an "ante-litteram" engineer and an exquisite artist as well. He painted the very famous "Vitruvian man" during his stay in Milan; well I like to pair his legs with infrastructure and rolling stock (they "sustain" the system), his head with the human capital, his arms with the operating rules and environmental constraints; and of course CCS is clearly at the heart, and well connected with all other parts. All the subsystems must indeed be connected and properly interact one each other, just like the parts of a man's body.

It's worth noting that the term "CCS Control Command Signalling" covers a wider range of functions and goes beyond the field of application of ETCS, CTCS, PTC… or other train control systems like them, which only control headways (train spacing), train speed and manage the cab signalling.

Signalling infrastructure enables us to:

1- <u>Manage rail traffic</u> on a meshed network, hence control train movements according to their type and constraints (freight/passenger/HS…); tomorrow it'll allow the trains to get rid of drivers and move autonomously and homogeneously, (without any constraints imposed by humans);

2- <u>Manage five risk scenarios</u>: Clashing, Convergence, Shearing, Divergence and Succession. The overall control relies upon three well different types of systems, that do intervene in logical/temporal sequence: a) at first the <u>centralised traffic control (overall traffic planning, management of congestions and disruptions)</u>, b) then the <u>signal boxes/interlockings</u> (safe train routing) and only at the end the Train Control System (like ERTMS/ETCS) for <u>safe train spacing and safe control of the speed</u>.

The choice of technology at each of these three levels must thus take account of the overall "rail system" goals of the network and any intervention/modernisation of a CCS system must meet systemic goals. We know that different ecosystems, different legal constraints and/or norms are to be respected around the world (different radio frequency bands for instance), yet all the railways have very common targets worldwide: Safety (first!), customer care, cost effectiveness, environmental protection, protection of investments.

The need for high level safety and cost effectiveness is at the base of some common trends for CCS innovative solutions worldwide:

1- Use of time continuous channel to connect train and track and use of radio link as physical medium for transmission of safety data;

2- integration of satellite geo-localisation (already a reality with projects like SATLOC and ERSAT among others) to limit or virtually eliminate the cost of balises in the track;

3- The latest trend seems to be looking towards satellites (low orbit?) also for the transmission of relevant safety data, reducing even more the high infrastructure costs of terrestrial radio networks.

Each railway's choice may therefore differ on each of the three aforementioned levels, but it must be made very carefully so to ensure that the system remains balanced on its usage and environmental context.

Signalling, a key enabler of the railway as a competitive worldwide transport backbone

Signalling, i.e. the interface between trains and tracks, should no longer be a barrier between regions, countries or continents, should no longer be a source of high expenditure. We should always apply the KISS principle: "keep it simple, sheep!" We all have to share our worldwide experiences, to work together to optimise the railway system on given corridors, crossing countries and continents, give rail transport the unique chance to be the cost-effective backbone

for the sustainable transport of goods and peoples, to contribute to the increase of the need of mobility. It's our task, it's our responsibility, it's our pride to keep the best for tomorrow from the network given by our parents and grandparents. Yes, moving in a coherent way rolling stock performances, track layout and telecom, operation and signalling performances, it should be possible, reachable, making it possible to interconnect in an interoperable way the worldwide railways.

Workshop Programme

In this Workshop we'll try of course to address topics of significant interest for the Australian ecosystem. The programme has been developed in agreement with NSW, ACRI and Public Transport Victoria. You will hear of Optimal Modelling and safety assessment of Signalling Systems and how important is the application of formal models; Cybersecurity (yet the "price" to pay for opening the rail system to modern IT technologies, like the use of Internet Protocol). You'll hear about the new trends of development in the CCS-Tlc, sometimes also called "Game Changers" as "ATO & ATS integration", the development of "Level 3" (ERTMS) in Europe; the "FRMCS" project and the big effort for the standardisation of new radio system, now sustained by UIC in collaboration with the European Union Agency for Railways, ETSI and 3GPP as well as the parallel important development of LTE-R in Australia. On the second day you'll also have the opportunity to listen to the proposals of some among the big suppliers of rail radio systems worldwide, who will try to provide concrete answers to railway needs.

As you can imagine looking at this broad overview, a link will be made between the feedback from yesterday and our dreams for tomorrow; dreams that we can realise together, but only all of us together.

The new signalling systems being developed worldwide offer new opportunities; however, we need to bear in mind that new risks are also emerging (like Cyber Security issues). Even when

sharing a global common vision, each network must carefully look at local integration of rail system components and how to modify it; the migration strategies towards new technologies can also be quite different in different regions. That is why UIC is here, to help our members, providing unbiased support at such important moments: we have **nothing to sell, nothing to buy, but everything to share in a spirit of mutual respect**. I hope that the workshop will give you the "building blocks" for shaping the future of your CCS-Telecom sector, the bricks and mortar with which to build your house, in coherence with others in the little town that our world is now.

ERTMS as a worldwide benchmark

Let me say a few words about ERTMS. The European Rail Traffic Management System has a worldwide positive benchmark, roughly 50% in Europe 50% outside, with regard to the number of kilometres of track equipped. They're mainly in new high-speed lines, above many different national interlocking and control centres; ERTMS is like a kind of Esperanto among countries, making it easier to cross borders and commercial exchanges; meanwhile other systems are also very actively developed in the world, for example: PTC (USA), ATACS (Japan), KLUB (Russia) among the most important ones.

For all what is needed to guarantee the radio bearer for ERTMS Level 2 as well as for the well emerging new Level 3, UIC works closely with the European Union Agency for Railways, in particular for the FRMCS project. Worth noting: the third and latest version of the FRMCS "Users Requirements Specification" is downloadable for free from the UIC website.

Conclusions

The customer is seeking attractiveness of the products that rail can offer (price, reliability etc), coupled with good connectivity. But rail suffers when either the infrastructure or the rolling-stock (or both) fail to live up to these customer expectations. The main one is "Punctuality &

availability 24/24 hours. This requires high levels of safety, availability, control of performance and Asset Management. It is by linking all of these points together that the system becomes able to fulfil its duties; the rail system can only work efficiently if it's designed, constructed, operated and maintained as a system, <u>especially its heart: the Control Command Signalling system</u>.