# White Paper

## Dyna Wiz

### How to Modernize Teleprotection Communication Channel without Changing Protection Devices

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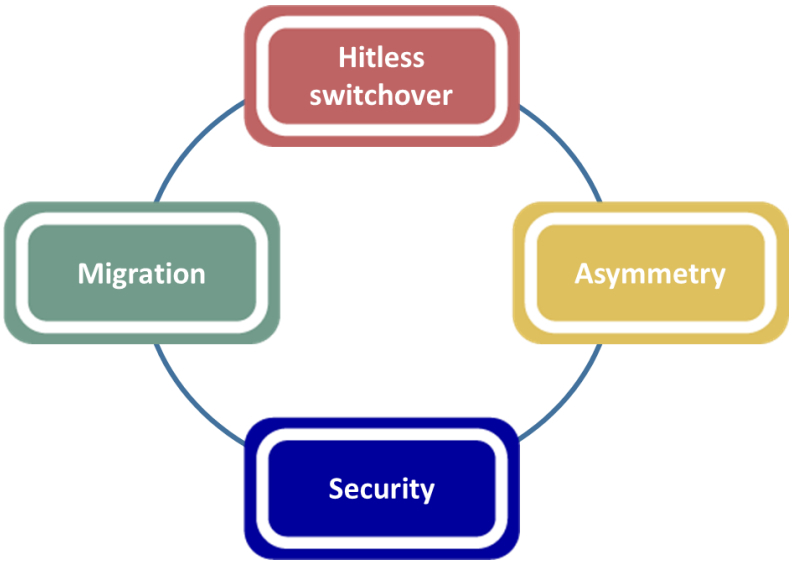
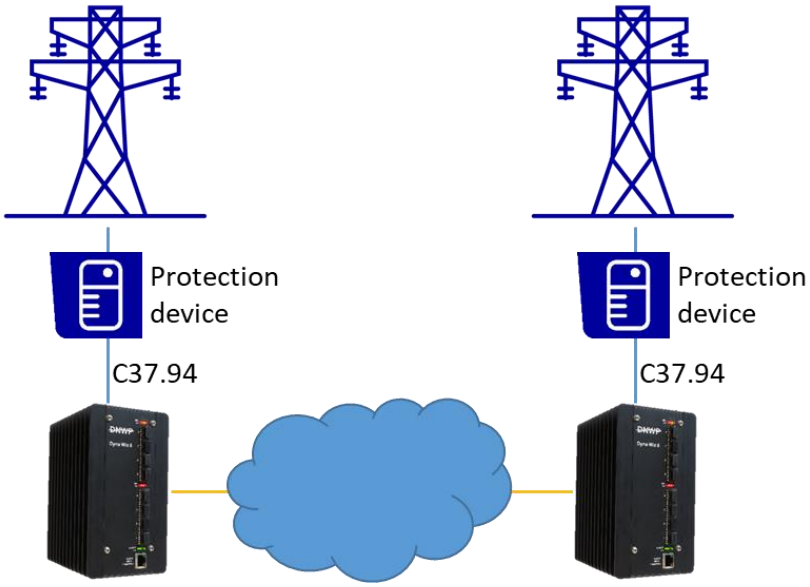


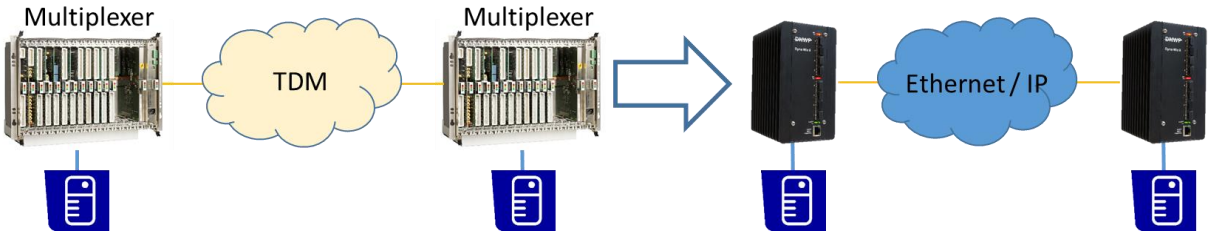

# 1 Introduction

Life cycle of line protection devices is very long, but the operational environment around evolves and sets new requirements. Communication networks go towards packet switched networks, cyber security policies are setting new requirements and zero loss availability requirements of critical infrastructure are getting stricter. All these changes set also new challenges to the protection services. To utilize full life cycle of teleprotection devices and minimize total cost of ownership, modernization of communication channel is the key procedure.



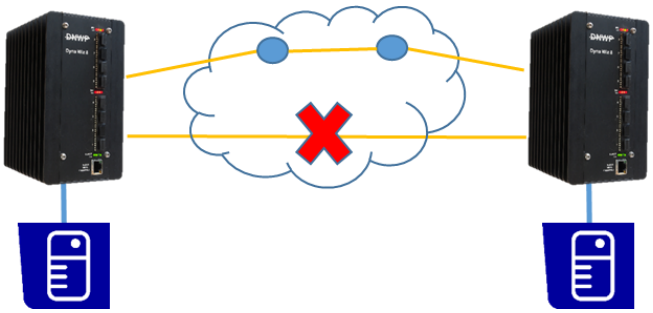
## 2 Migration

The TDM based technology has been widely adapted as the communication channel for the teleprotection services. Telecom operators have already migrated from TDM technology to packet switched networks years ago and that will affect also electricity power utility companies. Typically EPU's new communication network deployments and leased line services are based on packet switched technologies to support classic interfaces circuit emulation service is required. With emulation already implemented C37.94 interfaces can be used over packet switched networks same as with TDM networks.



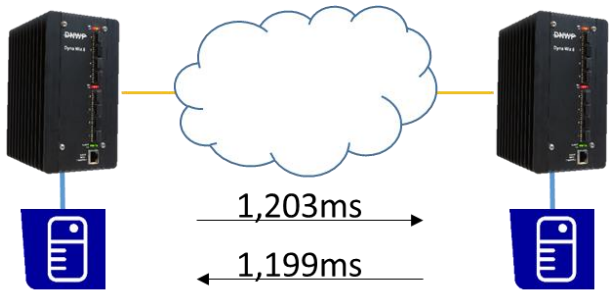

## 3 Hitless switchover

Distance and differential protection devices require the reliable low latency communication channel. Direct fiber connections are the optimal solution, however in the most of cases needed fiber infrastructure is not available. Especially creating protected paths is difficult without the communication network. The most common failure in any network is cut in the fiber or cable. Switchover times from primary to back-up fiber in well-designed networks have been below 50ms, but sometimes this is too much for error free communication of protection devices. Modern equipment can solve this issue with zero loss hitless switchover without any data loss.



## 4 Asymmetry

Delay asymmetry is the critical factor for differential protection and it's difficult to manage in standard packet switched networks. Connection oriented MPLS-TP with bi-directional paths is the solution for zero asymmetry. However sometimes electricity power utility companies are forced to use IP routed networks without controlled asymmetry. Also failure in network or configuration could jeopardize asymmetry figures. C37.94 interface with round trip delay and asymmetrical delay measurements, adjustments and alarms will secure differential protection relays against false trip conditions. These functions can be enabled also in environments without controlled asymmetry, like operator leased lines.




## 5 Security

Cyber security with data encryption and authentication is the desired function, but C37.94 interface like any serial data channel does not support either. For protection messages authentication of correct source and content is more important than the confidentiality of the messages. Even direct fiber links over the wide area are not protected against man in the middle attacks and paths over telecommunication network have even more possible attack vectors. C37.94 interface can be end to end encrypted with the strong algorithm using correct equipment. Encryption key management can enabled in the same devices without need to share keys with any 3rd party.

# 6 Dyna Wiz

DNWP Dyna Wiz is the compact solution for all challenges and it enables modern functionalities to existing systems with minimum changes. It can support C37.94 transport over MPLS-TP networks as well as any L2 or IP routed network Advanced features for electricity power utilities are encrypted C37.94, asymmetry measurements and hitless path protection switchover. Same functionality can be also applied with other commonly used teleprotection communication interfaces, like E1, G703 and X.21.