ENABLING 5-85MHZ RETURN PROJECTS

AN OVERVIEW OF THE ENGINEERING SCOPE AND FINANCIAL IMPLICATIONS

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The purpose of the paper is to explore the reasons why 5-85MHz return projects should be considered, discuss potential project scope, and provide insight into achieving successful project outcomes. 5-85MHz return projects are extremely complex and service provider environments vary widely in design and scale. The paper will explore high-level business and technical project considerations. The paper is not intended to be used as a project plan for a specific use case.

Executive Summary

The service provider business environment is more competitive than ever with some very large entrants to the market in the last decade. The more recent entrants include Google with gigabit speed fiber deployments, and a variety of over-the-top (OTT) content providers. Many of the new entrants have increased bandwidth (BW) demand on service provider networks while impacting video subscriber numbers. The widening use of social media and gaming applications have also increased the amount of peer-to-peer traffic on service provider networks. Service providers have experienced aggressive compound annual growth rates (CAGR) in both the downstream (DS) and upstream (US) directions (2). Extreme CAGRs and business customer use cases are causing service providers to consider 5-85MHz return projects. Some of the questions being asked by service provider leadership: Why should we do a 5-85MHz return project? What is involved in the 5-85MHz return project? What steps should we do when? How do we execute the 5-85MHz return project in a way that makes sense from a business perspective? How will DOCSIS 3.1 (D3.1) affect the need for a 5-85MHz return project?

Service providers seek to expand capacity to meet or exceed customer BW demand through the most effective use of capital expenditure. A 5-85MHz return project must be considered in the context of feasibility and a specific service provider's business objectives. DOCSIS 3.1 (D3.1) will have a positive impact on feasibility, but may also delay the necessity of a 5-85MHz return project. D3.1 requires cable modems to provide a much higher upstream (US) operating frequency, driving the availability of 85MHz US capable modems. 85MHz capable cable modems are needed to realize revenue from 85MHz return projects. D3.1 could also have the effect of delaying 85MHz return adoption by expanding the US throughput achievable in 5-42MHz returns.

Service providers are also looking for better ways of reaching underserved market segments for revenue expansion. Many service providers have specifically commented on the need to reach a gap in their business customer segment that falls between the typical DOCSIS business customer and the direct-fiber business customer. As a result, some service providers are exploring the possibility of using 85MHz returns with

additional US carriers to deliver higher symmetrical data speeds to targeted midsize business customers.

5-85MHz return projects vary widely in complexity. The decision to execute a 5-85MHz return project should only be made after a comprehensive assessment is conducted. Successful outcomes depend on a detailed understanding of the involved scope, well-established financial guidelines, and clearly stated time constraints.

Why Should a Service Provider Expand the Return Path to 5-85MHz?

Service providers spend capital to grow revenue, grow subscribers, and reduce operating costs as a percentage of revenue. Every project must be weighed against other alternative uses of available capital. 5-85MHz return projects are no exception to the rule and must be prioritized according to each service provider's specific financial guidelines. Some 5-85MHz return path projects may make a service provider's capital budget, while others may not. Understanding the scope of each use case being considered is essential to the evaluation of the project.

Carrier modulation profile upgrades, upstream carrier additions, and segmentation are examples of how service providers continue to get more out of their existing 5-42MHz returns. Many service providers will remain at 5-42MHz returns in the near term, continue to segment, use DOCSIS 3.1 as a delay strategy, and make a choice between mid-split (5-85MHz) and high-split (5-200MHz) at a later date. However, upstream speeds associated with gigabit speed tier launches, higher symmetrical speeds for business customers, and aggressive upstream CAGRs are causing service providers to consider 5-85MHz return BW expansions sooner, rather than later. Some service providers have already deployed or are currently field testing 5-85MHz returns.

Service providers may also choose to deploy 5-85MHz returns for new build while gradually preparing the existing plant for the transition to 5-85MHz returns. Service providers may also elect to upgrade the forward path at the same time as the return path to achieve better economies of scale and efficiencies for both projects. The exact course of action taken by a service provider will depend on the scope of the project in the context of the service provider business objectives. Service providers must understand each of the project elements involved to accurately assess the scope of transition to 5-85MHz returns and to properly time the transition for the maximum return on investment.

What is Involved in a 5-85MHz Return BW Expansion?

The elements of a 5-85MHz return BW expansion project span the home network to the headend (1). The project elements will vary depending on the service provider network characteristics and business objectives. The elements may include, but are not restricted to the following:

- Removal of set-top boxes (STB) that have fixed out-of-band (OOB) carriers below 102MHz
- STBs with agile OOB carriers must have the proper firmware to allow the migration of the OOB carrier. Potentially requires a firmware upgrade.
- Alternatively activate DOCSIS Settop Gateway (DSG) for OOB in CMTSs and STBs with DSG support
- Split OOB carrier and up-convert one split to facilitate easier OOB migration
- Create a separate services/channel line-up for 85MHz return business customer node deployments
- Change channel maps
- Clear the downstream spectrum that exists below 102MHz for return and crossover
- Reclaim analog carriers (consider programming agreements)
- Digital migration of previous analog content
- Filter additions, to protect older devices in homes, and removal of any devices with diplexors in the home network
- Diplexor changes in nodes, amps, equalizers, and equalized taps
- Swap out node digital return transmitters that are not 85MHz capable
- Adjust return TX levels to not exceed total power specifications in return TXs
- Coordination of forward path BW upgrade with return path BW upgrade when necessary
- Deployment of 5-85 MHz capable return CPE (DOCSIS 3.1)
- CMTS configuration enabling 85MHz upstream parameters
- Marketing and billing integration of new products enabled by 5-85MHz return BW expansion

Each of the elements represents a critical process in project execution. Service provider business objectives require that capital expenditures be moved as close to the realization of revenue as possible. Successful 5-85MHz return projects require extensive project planning and deliberate execution. Experienced professional services organizations can assist service providers in managing the complexities of the project scope.

Executing the Elements

Some of the questions that should be considered before executing a 5-85Mhz return project: What is the strategy for the collective execution of each of the different use

cases contained in the project? What project elements can be executed with negligible capital outlay? What project elements can be executed with internal staff and what project elements will require outside resources? What is the shortest path to revenue generation? What should I do today to make it easier to transition to 5-85MHz returns in the future? What professional services support will be required to obtain a successful outcome?

The potential use cases may include, but are not restricted to the following:

- New business customer node deployments with 5-85MHz returns
- New residential node deployments with 5-85MHz returns
- Migrating customers in existing node footprints to 5-85 MHz returns
- Upgrading the forward path spectrum to 1.002GHz or 1.218GHz in conjunction with the 85MHz return path BW expansion

SUMMARY

Market forces are aggressively increasing customer bandwidth consumption, causing service providers to consider the execution of 5-85MHz return projects. A 5-85MHz return project involves the home network, the outside plant network, the set-top OOB network, data network, CMTS, 85MHz capable DOCSIS CPE, billing and provisioning systems, and the coordination of engineering, operations, and marketing functions. Because of the extreme complexity, 5-85MHz return projects require extensive and deliberate project planning. Some operators may need to move quickly while others can wait years. Service providers should consider an exhaustive analysis of business objectives versus network readiness before launching this type of project. ARRIS has consulting, program management, and engineering resources to assist service providers in the analysis and implementation of a successful 5-85MHz return project.

MEET ONE OF OUR EXPERTS: CRAIG HUGUELEY

Craig Hugueley has extensive experience at managing the operation of large-scale cable access networks. As a former VP of Engineering Operations at TWC, Craig Hugueley has led successful large plant upgrades, multiple hub construction projects, new product launches, and several major technology migrations. Since arriving at Motorola and then ARRIS, Craig has worked as a Video Product Specialist and currently as an Account Director, Edge Product Specialist. Edge products include the CMTS/CCAP platforms and ATS (Access, transport, and supply) products. One of Craig's key functions in his current role is to assist customers in developing their CMTS/CCAP and Access technology evolution strategies.

RELATED READINGS

- Making Rational HFC Migration Decisions in the Midst of Chaos by Dean Stoneback and Fred Slowik.
  http://www.arrisi.com/dig_lib/white_papers/_docs/NCTA13-Rational_HFC_Upstream_Migration.pdf

- Breathing New Lifespan into HFC: Tools, Techniques, and Optimizations by Dr. Robert Howald.
  http://www.arrisi.com/dig_lib/white_papers/_docs/NCTA13-Breathing_New_Life_HFC.pdf

REFERENCES

(1) D. Stoneback & Fred Slowik (2013). *Making Rational HFC Migration Decisions in the Midst of Chaos.* http://www.arrisi.com/dig_lib/white_papers/_docs/NCTA13-Rational_HFC_Upstream_Migration.pdf

(2) R. Howald (2013). *Breathing New Lifespan into HFC: Tools, Techniques, and Optimizations*. http://www.arrisi.com/dig_lib/white_papers/_docs/NCTA13-Breathing_New_Life_HFC.pdf