[redacted]

19 November 2019

Oxford Nanopore Technologies' views on Illumina's and PacBio's response to the CMA's notice of possible remedies (dated 7th November 2019)

ANNEX

1. Overview

The Parties' offer consists of patents of limited value and fails to even include patents related to the offered patents currently being prosecuted in multiple jurisdictions. The Parties' offer is empty and made in furtherance of a strategy designed to perpetuate serial and never-ending litigation against ONT. Despite the fact that neither PacBio nor Illumina have nanopore sequencing products both are actively seeking patents in this space with the express intent of blocking ONT's access to the sequencing market. Indeed, both Parties have expended substantial resources in litigation though neither has nor appears to have plans to launch a nanopore based sequencing product.

PacBio and Illumina have a history of abuse of the patent system involving seeking patent protection for unpracticed nanopore technologies in multiple jurisdictions as evidenced by the serial filing of numerous generic applications that provide nothing beyond the application of known and standard biotechnological techniques to nanopore. The Parties then waited for ONT to demonstrate the viability of its technology before going back and recrafting "submarine claims" designed solely to tie up ONT's commercial efforts. And while ONT has to date been successful in defeating these challenges, the intensity of these attacks promises only to intensify if the merger proceeds.

Indeed, over the past five years, ONT has weathered multiple patent challenges from Illumina and PacBio. In 2016 Illumina convinced the ITC to initiate an investigation of ONT based upon Illumina's assertion that its patents on MSP nanopores, licensed from the University of Washington, covered ONT's products. ONT was in the process of phasing in a new nanopore in its sequencing devices that precipitated a no cost settlement. [redacted]

In 2016, PacBio convinced the ITC to initiate an investigation of ONT based upon two patents PacBio asserted covered nanopore sequencing and, in particular, ONT's 2D nanopore sequencing process. The ITC disagreed, entering a summary determination after claim construction that PacBio's patents did not cover nanopore sequencing, but instead were limited to the template dependent processes used by both PacBio and Illumina in their sequencing systems. The ITC's findings were affirmed on appeal by the Court of Appeals for the Federal Circuit by *per curium* order.

In the Delaware Action, PacBio is seeking an injunction against ONT based upon its assertion of four patents, none of which are embodied in or practiced by a PacBio product. While ONT does not believe the asserted patents are either valid or infringed, [redacted]

[redacted] and ultimately prevent the public from practicing nanopore sequencing. [redacted]

The patents at issue in the Delaware action exemplify the abusive nature of the Parties tactics. The patents at issue were filed long before the claimed nanopore sequencing was a viable technology. The "inventions" disclosed in the asserted patents in large part amount to nothing more than an enumeration of known biotechnology techniques paired with generalised statements as to how those techniques might be applied in nanopore sequencing. Absent from these patents is any experimental data or working examples, which is not surprising, given that PacBio has never performed nanopore sequencing. PacBio prosecuted these applications with an eye towards thwarting ONT's development of nanopore sequencing. These applications were nursed through prosecution for almost a decade, watching and waiting for ONT to develop its products. It was only after ONT proved that nanopore could be used in a commercial setting to sequence DNA that PacBio went back to the USPTO with claims crafted to cover ONT's products.

The Parties are also actively seeking more patents in the nanopore space beyond those enumerated in the offer. PacBio continues to perpetuate its misuse of the patent system by filing continuation patent applications relating to the patents at issue in the Delaware case. In March 2019, the District Court in Delaware found the asserted claims of the asserted '056 Patent invalid because it was indefinite. While the court subsequently walked that ruling back, PacBio has sought to address that definiteness problem with the asserted claims through its continued prosecution of related applications before the USPTO. On November 12, 2019, PacBio was successful in getting claims allowed that it argues overcomes the definiteness issue flagged by the Court. Presumably it is PacBio's plan to assert this patent against ONT as it is conspicuously absent from the Parties' remedies proposal.

PacBio has [redacted].

2. Summary of the IP directly related to and excluded from the Parties IP remedies proposal

PacBio continues to seek EP and U.S. patents and has obtained U.S. patents which appear to be of particular relevance to nanopore sequencing and **directly related** to the patents listed in the Parties' IP remedies proposal which are nonetheless notably absent from this proposal.

A (non-exhaustive) list is as follows:

EP patents and applications related to EP3045542 and EP3170904.

EP3269824A	EP3252170A	EP3245060A

U.S. patents and applications related to one or more of US9678056, US9738929, US9404146 and US9546400.

US10,473,639	US15/654,395	US16/575,063
US9,542,527	US9,582,640	US9,600,626
US9,057,102		

Related patents in jurisdictions other than the U.S. or Europe.

AU2015202111B2	CN102084001B	CN104862383B

By way of example, U.S. Patent 10,473,639 has claims of very similar scope to the one of the patents being asserted in the Delaware District Court, U.S. Patent US9,678,056. To the extent that PacBio is asserting that the U.S. '056 patent is relevant to ONT's products, the presumably PacBio would be of the opinion that U.S. '639 would also be relevant.

US9,678,056	US10,473, 639
Claim 1: A method for sequencing a nucleic acid template comprising: providing a substrate having an upper solution above the substrate and a lower solution below the substrate, the substrate comprising a nanopore connecting the upper solution and lower solution, the nanopore sized to pass a single strand of a nucleic acid; providing a voltage across the nanopore to produce a measurable current flow through the nanopore; controlling the rate of translocation of a single stranded portion of the nucleic acid template through the nanopore with a translocating enzyme that is associated with the nucleic acid template under reaction conditions whereby the translocating enzyme and the reaction conditions are selected such that the	Claim 1 A method for sequencing a nucleic acid template comprising: providing a substrate having an upper solution above the substrate and a lower solution below the substrate, the substrate comprising a nanopore connecting the upper solution and lower solution, the nanopore sized to pass a single strand of a nucleic acid; providing a voltage across the nanopore to produce a measurable current flow through the nanopore; controlling the rate of translocation of a single stranded portion of the nucleic acid template through the nanopore with a translocating enzyme that is associated with the nucleic acid template under reaction conditions whereby the translocating enzyme and the reaction conditions are selected such that the

translocating enzyme exhibits two kinetic steps wherein each of the kinetic steps has a rate constant, and the ratio of the rate constants of the kinetic steps is from 10:1 to 1:10; measuring the current through the nanopore over time as the nucleic acid template is translated through the nanopore; and determining the sequence of a portion of the nucleic acid template as it translates through the nanopore using the measured current over time.	translocating enzyme exhibits two kinetically observable steps wherein each of the kinetically observable steps has a rate constant, and the ratio of the rate constants of the kinetically observable steps is from 5:1 to 1:5; measuring the current through the nanopore over time as the nucleic acid template is translated through the nanopore; and determining the sequence of a portion of the nucleic acid template as it translates through the nanopore using the measured current over time.

3. Illumina IP of relevance to nanopore sequencing

The Parties proposed remedies does not include any of Illumina's IP relevant to nanopore sequencing.

For example, Illumina similarly continues to pursue patent coverage for inventions initially disclosed in ONT IP. Illumina's U.S. Patent No. 9,116,139, for example, was filed more than a year after the disclosure of ONT's U.S. Patent No. 9,651,519 was originally published (as PCT Application No. PCT/GB2010/002206), and Illumina's patent includes claims to a sequencing device virtually identical to what ultimately issued in ONT's patent.

Illumina's U.S. Patent No. 9,116,139	**ONT's U.S. Patent No. 9,651,519**
1. A sequencing device, comprising: a sample device configured to receive a biological sample and process the biological sample during a sequencing run; a detection module coupled to the sample device, wherein the detection module comprises detection circuitry configured to acquire sequence data representative of nucleotide identities from the biological sample during the sequencing run; and at least one processor programmed to: receive the sequence data as the sequencing run is in progress;	1. A sequencing device, comprising: a sensor device configured to receive a biological sample and process the biological sample during a sequencing run; a processing module coupled to the sensor device, wherein the processing module comprises processing circuitry configured to acquire sequence data representative of the nucleotide identities from the biological sample during the sequencing run; and at least one processor programmed to: receive the sequence data as the sequencing run is in progress;

determine the nucleotide identities of the biological sample based on the sequence data; generate one or more files comprising the nucleotide identities; analyze the nucleotide identities to determine if the acquired sequence data from the biological sample is sufficient; and provide an indication that the sequencing device is available in response to determining that the sequence data from the biological sample is sufficient to determine a characteristic of the biological sample, wherein the indication is provided while the detection module is acquiring additional sequence data from the biological sample during the sequencing run and before the sequencing run is complete; wherein the processor is programmed to reassign the detection module to sequence a second biological sample after sufficient sequence data from the biological sample has been acquired and before the sequencing run is complete.	determine the nucleotide identities of the biological sample based on the sequence data; generate one or more files comprising the nucleotide identities; analyze the nucleotide identities to determine if the acquired sequence data from the biological sample is sufficient; and provide an indication that the sequencing device is available in response to determining that the sequence data from the biological sample is sufficient to determine a characteristic of the biological sample, wherein the indication is provided while the processing module is acquiring additional sequence data from the biological sample during the sequencing run and before the sequencing run is complete, and wherein the processor is programmed to reassign the processing module to sequence a second biological sample after sufficient sequence data from the biological sample has been acquired and before the sequencing run is complete.

Although Illumina has represented that a driver of its purchase of PacBio is PacBio's nanopore expertise, there does not appear to be anyone at PacBio who has ever done nanopore sequencing. Instead, PacBio's nanopore activities are limited to it active efforts to obtain and assert unsupported concept patents to block ONT.